ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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Telephony vs. Telegraphy—The Expense of Long Distance Work.

According to *Nature*, the question of telephony *vs.* telegraphy has been recently discussed by a well-known German electrician, Dr. Wietlisbach. The chief hindrance to the use of the telephone for long distances is, he points out, of a financial, not of a technical nature. A telephone line 2,000 km. long (about 1243 miles), costs considerably over a million marks ($250,000). It is still possible to speak very well this distance; but even supposing the line were in constant use day and night, the receipts must be 5 marks (say shillings) a minute to make it pay. In telephone work, however, the line is in use only a few hours daily; hence a short conversation would cost at least 50 marks (£2 10s.). That is, of course, too dear for ordinary traffic. The telegraph works, with almost the same speed, more than ten times more cheaply. Thus the question as to rivalry between telephone and telegraph finds its settlement. The telephone, up to about 500 km. distance (say 310 miles), will more and more displace the telegraph, and find an extension which the telegraph would never reach. But for greater distances the telegraph must keep the upper hand. Thus telephone and telegraph are really not rivals, but fitted to supplement each other.

Interesting Meeting of the Electric Club.

The regular monthly meeting of the Electric Club was held at the club rooms, Thursday evening, November 4. Among those present were H. C. Davis, president; J. F. Morrison, Baltimore, President of the National Electric Light Association; John I. Sabin, of San Francisco; D. W. Evans, Baltimore; C. O. Baker, Jr.; M. W. Goodyear, H. C. Adams, George H. Benjamin, Commodore Schuyler, Geo. Worthington, Willard Candee, Geo. T. Manson, H. D. Stanley, C. B. Hotchkiss, H. N. Reed, Stephen D. Field, H. W. Pope, Eugene T. Lynch, Jr., C. H. Barney, Chas. W. Price, Amos Broadnax, H. B. Thayer, H. R. Garden and others.

A meeting of the Board of Managers was held at 6 o'clock, and twelve new members were elected, and several other applications posted in accordance with the rules governing the club. Dinner followed, and then Dr. Geo. H. Benjamin presented a paper entitled, "Rules to be Observed in Handling Electric Currents as used in Electric Lighting and Transmission of Power." The address was earnestly discussed by Messrs. Morrison, Sabin, Davis, Pope, Hotchkiss, Broadnax, Lynch and Field, some taking issue with several points made by the author and endorsing others. The discussion was quite animated at times, and very interesting. It was decided to have the rules printed as submitted, and a copy sent to each member, to be finally acted on at the next meeting. A resolution of thanks was tendered Dr. Benjamin and the meeting adjourned.

Effect of Lamp Shades on Eyesight.

In some interesting experiments made by an English oculist, on the relative values of various forms of lamp shades, an important result was arrived at. The method pursued by him was to measure the brightness of white paper lying on a table over which the source of artificial light was suspended at a given distance by means of a Weber photometer. Thus the fact was confirmed that the general effect of a shade is to increase very greatly the illumination immediately under the light, while not modifying it notably at an angular distance greater than forty-five degrees from this region. Taking as a measure of the value of the illumination in this case the number of lines which can be read from a newspaper in a minute, and as the unit of illumination that of a normal candle at a perpendicular distance of a meter from the paper, it is found that the best illumination is not less than fifty such units, but even a fifth of this illumination is very rarely secured, except immediately under a lamp provided with a good shade.

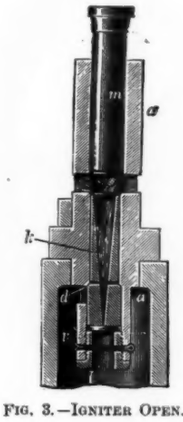

FIG. 3.—IGNITER OPEN.

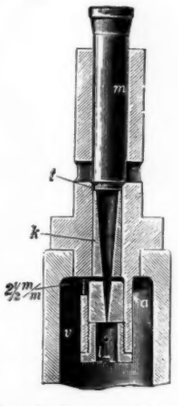

FIG. 4.—IGNITER CLOSED.

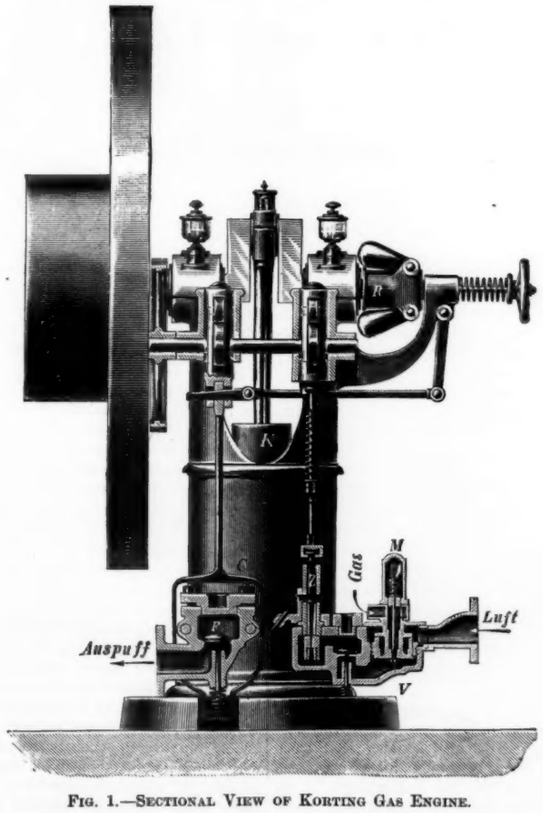

FIG. 1.—SECTIONAL VIEW OF KORTING GAS ENGINE.

The Korting-Lieckfeld Gas Engine.

This new and improved gas engine, which is thoroughly illustrated in this issue, is being introduced in America by the Korting Gas Engine Company, of 60 Barclay street, New York, Mr. Geo. W. Silcox being general manager of the company. According to the opinion of eminent engineers these engines are of the highest value for small manufacturers, and are coming into popular use for special fields of electric lighting. The operation of the engine is described as follows, the working piston supposed to be moving upwards: The piston of the pump will move in the same direction, drawing in the inflammable mixture of air and gas during its whole stroke. When the main piston gets near the end of its stroke, the exhaust valve opens, exhausting the consumed gases under the piston, as the latter descends. At nearly the same time the pump forces fresh explosive mixture through the passage *L*, Fig. 2, into the compression space *H*. The direction of this mixture is such that it will strike the wall of chamber *H*, opposite the inlet, by which the current loses its initial velocity, spreading out and filling the chamber, remaining below the hot residual gases by its superior gravity. Whatever the quantity of fresh mixture introduced into *H*, an equal quantity of consumed gases is thereby expelled through the exhaust valve. When the working piston is near mid-stroke downwards the exhaust valve is closed, thus imprisoning a layer of consumed gases between the piston and the explosive mixture. Hereafter compression of the gases occurs on one hand from the descent of the working piston, and on the other by further introduction of the explosive mixture through the pump, the piston of which is still descending. When the working piston has completed its downward stroke, the charge is set on fire by the igniting device shown in Figs. 3 and 4. By the combustion of the charge the neutral gases above the same are heated, and the piston is driven upward by the expansive force of the entire contents of the cylinder.

The igniting device consists of a barrel or cylinder, open at the bottom, in communication with the mixture to be ignited. A gas jet burns before a port in the barrel, above *t*, the port forming communication between the interior of the barrel and the atmosphere.

In the lower part of the barrel is a movable tube *k*, cone-shaped at the bottom, and provided with the small holes shown at *d*. In the upper part of this barrel is a plunger *m*, which constitutes a valve, operated from the engine. When this plunger is depressed, it closes the upper port at *t* in the barrel, as shown. When it is lifted to open the port, the gaseous mixture is admitted to the cylinder and compressed, which closes the small holes at *d* by raising the lower movable tube. At the same time a small quantity of the gaseous mixture passes through a minute aperture at the apex to the interior of the tube, and is ignited by the permanent gas jet. A small flame, fed from the cylinder, will then continue to burn inside the lower tube. The plunger being at this time depressed, closing the port at *t*, thus cutting off communication with the atmosphere, the pressure inside will speedily become as great

as it is outside, causing it to drop to the position shown, and noted as "shut." The tube being in its bottom position, the ports *d* communicate with the barrel, thereby firing the charge in the cylinder. For controlling the speed, an auxiliary chamber, or receiver, is, by suitable channels, placed in communication with the feed pump and with the cylinder. In these channels, valves, controlled by the governor, are arranged. According to the position to which these valves are moved by the governor, they conduct the gaseous mixture either to the cylinder or to the receiver. By turning the small handwheel shown in Fig. 6, the speed can be changed at will.

The lettering in Figs. 1, 2 and 6 are explained as follows: *C* is the cylinder; *K*, the piston; *H*, compression space; *W*, water jacket; *M*, mixing valve; *V*, check valve; *Z*, igniter; *L* channel for lighting and gas introduction; *P*, channels for discharging products of combustion; *F*, discharge valve, and *R* the governor.

The mixing valve is shown in Fig. 7. In this the course of the gas and air is plainly shown.

These engines have been honored in competitive contests by the diploma of honor, Nice, 1884; gold medal, Amsterdam, 1884; gold medal, Antwerp, 1885.

The Method of Building the Subway.

The *N. Y. World* has the following to say about the present status of the subway business:

Few people have an exact idea of the financial operation or of the engineering and mechanical difficulties involved in "putting the wires underground," in accordance with the law of June, 1885. The board appointed to carry out the law is at present constituted as follows: Roswell P. Flower, president; Theodore Moss, secretary; and Jacob Hess, with Col. Henry S. Kearney as supervising engineer. Shortly after Mr. Flower's appointment to fill the vacancy caused by the death of Commissioner Loew, and after the examination of various plans and scientific tests of material, a contract to build and maintain all the electric conduits required in this city was awarded to the Consolidated Telegraph and Electrical Subway Company. This company is organized with a capital stock of $3,000,000. Its President is Ewald Balthasar, of the banking firm of Hallgarten & Co., who, with Henry J. Davison, a lawyer of No. 231 Broadway; James B. Houston, President of the Pacific Mail Steamship Company; Henry Fitzhugh, of Chicago, and Frank L. Freeman, of Washington, form the incorporators and Board of Directors. A change in the Board will probably be brought about at the next meeting as the result of an arrangement recently made by Edward Lauterbach in behalf of the Subway Company with the Western Union Telegraph Company and the Metropolitan Telegraph Company. According to Mr. Lauterbach these companies have agreed to advance to the construction company money sufficient to carry on its work for at least two years, taking in return stock of the Subway Company in ratio to their proportionate use of the system. By avoiding opposition and litigation the company has not only strengthened its financial position, but secures the practical cooperation of the electrical companies in the rapid construction of its subways.

A bond for $500,000 was given by the company, which, curiously enough, binds itself under this heavy penalty to build and maintain conduits as the commission directs, the size, material or style of the work not being specified. The company must provide the subway and depend for returns upon the rental to be hereafter derived from letting the use of the conduits to the different telegraph, telephone and electric light companies. In no case must any company be refused accommodation, discriminated against or charged more than the ascertained expense of maintaining the wires above ground. Whenever the net annual rental of the subways exceeds 10 per cent. of the capital actually expended, one-third of such excess must be returned to the companies occupying the subway, and another third paid into the city treasury. Space for the wires of the city fire and police telegraph system will be supplied free of charge.

It is estimated that about fifty miles of the subway will be required to accommodate all the wires, and that the total cost of the work will not fall short of $2,000,000. Subcontracts were made with James D. Crimmins for the excavation of the Sixth avenue sections at an advance of 15 per cent. on the actual cost, and with the Dorsett Asphalt Company (subsequently reorganized under the name of the American Insulated Conduit Company) for making and laying the conduits at the rate of $1,000 a mile per duct. Each duct will accommodate about one hundred wires. It is estimated that the subway company will charge about $500 a year per duct; in fact, a contract on that basis has already been made with the Metropolitan Telephone Company. The rental of the three-mile twenty-four-duct conduit, from Carmine street to Central Park, now in process of construction, will thus amount to about $36,000 a year.

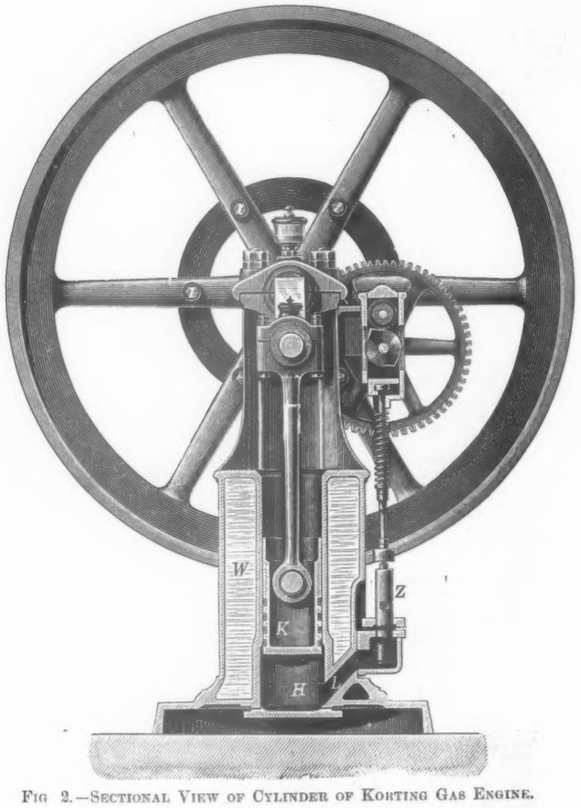

FIG 2.—SECTIONAL VIEW OF CYLINDER OF KORTING GAS ENGINE.

The network of gas, water and steam-pipes and sewers underlying the streets presented one of the greatest difficulties to be met by the engineers. Other considerable obstacles to be overcome were insulation, induction and retardation of the electrical current incident to an underground service. As said by Engineer Thompson, in his preliminary report, "Many phases of the underground problem are yet in the tentative stage, and a satisfactory demonstration can only be accomplished by the test of practical experience." This fact adds interest to a description of the conduit now actually completed from Twenty-fourth street to Fortieth street on Sixth avenue.

The conduits are a hard asphaltic compound, containing 70 per cent. of sand and cast in cylinder-shaped moulds. Each block contains twelve longitudinal apertures, each 2½ inches in diameter and enlarged at the ends to allow of the insertion of short, pitch hardened paper tubes, of the same interior diameter, used to make the joints. The block are made in 3-feet lengths, 17½ inches wide and 13 inches in depth, and weigh about 200 pounds each. When hardened and tested at the factory they are brought to the trench in truck-loads. A 6-inch bed of concrete is laid on the bottom of the trench and when it has hardened sufficiently the blocks are laid upon it in two longitudinal rows. This is an exceedingly exact piece of mathematical work. Not only must the trench be perfectly aligned, both as regards the vertical and horizontal planes for the length of a block, but the concrete bed must conform accurately to the grade of the section and a straight line drawn along its center by a theodolite. The blocks are kept accurately in line, and each placed in position about an inch from the preceding one. After the end faces of the blocks have been softened by placing a hot iron plate between them, the paper tube joints are inserted. Long wooden mandrels are then pushed through them and into a third block from the open ends of the blocks last laid, when the segments are pushed together until the paper tubes are seated. This brings them within an inch of each other. Securing the joints by iron clamps, hot mastic is introduced into the spaces and thoroughly worked in around the interstices by hot iron bars. When these joints have hardened the clamps are removed, the mandrels withdrawn, the longitudinal interval between the rows and a course of brick laid over and around the double conduit. Adapting the construction to the exigencies of the street obstructions, in some sections the blocks are laid flat and in others placed on their narrow edge. The illustration shows a section of the conduit coming into a manhole in either way.

These manholes are placed at every street intersection on the line of the subway, and form an exceedingly important feature of the system. They are large openings shaped so as to utilize every inch of space to the greatest advantage, lined with brick treated with hot paraffine so as to be impervious to air or moisture, and protected when closed by a double iron cover ingeniously arranged somewhat on the familiar plan of the top of a preserve jar, making the conduit an air-and-water proof continuous subway from one end to the other. It is at these openings that the cables are inserted into the conduit, examination and repairs made and from these iron pipes for local distribution led. Nothing puzzles the uninitiated mind so much as how heavy cables can be put through the small openings. The all-sufficient professional explanation, that they are attached to a leading wire and pulled through only suggests the theological darkey's worry about "who laid the first egg?" How did the leading wire get there? is, however, a question easily answered. This wire is made of strong, well-tempered steel, which straightens itself out as it is unwound from a drum and is kept in position by passing between two small wheels before entering the orifice of the conduit. In pulling heavy cables through it, a windlass, like that on a ship's deck and manned by several men, will be used.

The first cable put into the new conduit was that of the city fire telegraph signal system, which was drawn through it from Thirty-seventh to Fortieth streets two weeks ago. The next wires to be buried will be those of the Metropolitan Telephone Company. In this connection it may be remarked that not the least boon to be derived from the subway is the improvement it is expected to work in telephone communication. Perfect insulation, freedom from induction and from injury by the elements may, indeed, so facilitate and perfect "'phoning" as to cause a perceptible diminution of profanity in this community and turn an instrument of torture into a joy and comfort.

An Electric Light Contest in Elmira.

Considerable excitement is prevailing in Elmira, N. Y., over the struggle between the Thomson-Houston and the United States Electric Co. At present incandescent lights are furnished at 66⅔ cents per month per lamp, and arc lamps at 6.50 per month. Both companies are well represented, and manage to meet each other on schemes. In conversation with Mr. W. Clarke, of the U. S., he said: "We are in Elmira to stay, and if the T. H. want blood (electrically) let them come to the front. This is too good a field to give up." While Mr. W. O. Faulkner, of the T. H., says, "We, the Co., have never been driven out of a town where we have had the U. S. for our opposition, and it is very poor policy to give up the ghost at this stage of the game. With the present size of our plant and the prices we are getting for our lights, we can stand it as long as they can." How much either of the managers know about the fate of their stations, remains to be seen. A few days since both companies received orders from their main offices not to put in any more lights until some kind of a compromise could be made. The excitement then became intense among the consumers, and some were heard to remark, "As soon as they form a monopoly they can take my lights out," etc. On account of the illness of Mr. C. A. Coffin, of the T. H., a compromise could not be arranged, and they are at it again putting in lights, regardless of the expense of running them.

B.

The First Watch.

At first the watch was about the size of a dessert plate. It had weights, and was used as a "pocket clock." The earliest known use of the modern name occurs in the record of 1552, which mentions that Edward VI. had "one larum or watch of iron, the case being likewise of iron gilt, with two plummets of lead." The first watch may readily be supposed to be of rude execution. The first great improvement—the substitution of springs for weights—was in 1560. The earliest springs were not coiled, but only straight pieces of steel. Early watches had only one hand, and, being wound up twice a day, they could not be expected to keep the time nearer than fifteen or twenty minutes in twelve hours. The dials were of silver and brass; the cases had no crystals, but opened at the back and front, and were four or five inches in diameter. A plain watch cost more than $1,500, and after one was ordered it took a year to make it.

* * Mr. J. M. McMahan, of 13 Park Row, this city, is doing some very interesting work in metallurgy, such as depositing copper in shells and ornaments of various kinds. There is a growing interest in this branch of electrical work.

Phenomena Attending the Eruption of Mount Tarawera.

Among the many extraordinary natural phenomena attending the eruption of Mount Tarawera, one which appears to me not the least singular has been passed over in comparative silence and without exciting comment, as far as I am aware, among the scientific or unscientific public. I allude to the fact of their being unable to make water boil on that terrible night, when earth itself appeared to be in a state of ebullition. I give here the narrative from Mr. McRae's own lips :

"I made George Baker, the cook, put some water on the fire to make cocoa for the women, who were cold and shivering, poor souls, though holding up grandly. About three-quarters of an hour afterward he met me in the passage and said to me :

"'Come here, sir.'

'What is it?' said I.

"'I can't get the water to boil,' he said.

"'Tut,' said I; 'poke up the fire.'

"'It's a good fire,' he replied, and so it was, a glowing fire of blazing rata logs—a splendid fire. 'Put your hand in there and feel it,' said he, taking the lid off the boiler.

"I did so very gingerly, I can assure you, and found the water as cold as when we put it on. There were so many extraordinary things happening around me that this particular one did not excite my wonder very much. I thought it was owing to the electricity in the air. George Baker can vouch, as well as myself, for the fact of the water having been on the fire for full three-quarters of an hour, and at the end of that time being as cold as when it was put on. We spoke of the circumstance to the others at the time as being curious, but soon had matters more serious to distract our attention."

Now, surely here is a natural phenomenon worthy the investigation of all our scientific men, not only in New Zealand, but throughout the civilized world. We, of course, all know that the greater the atmospheric pressure the greater the number of units of heat required to make the water boil, but some other deterrent cause must have been at work in this instance, as, after having been placed for three-quarters of an hour on a good fire, the water remained absolutely cold. What other cause was there? is the problem I suggest to our scientific men as one well worthy of our research.

On the night of the Tarawera eruption the Haszard family had in their cash-box, among other moneys, a half sovereign lying on the top of four half crowns. During the storm which burst over their devoted residence the building was struck by lightning. On digging out the effects the working party handed over the cash-box to the friends of the Haszard family. John P. Morpeth, of Ponsonby, at whose house Mrs. Haszard has been staying, has now in his possession the half sovereign and four half crowns, which form a perfect curiosity. The lightning appears to have fused the coins together, and in some mysterious way, though the face of the half sovereign is not defaced, the gold appears to have been driven through the center of each of the half crowns, as each in the center is colored the size of a shilling as if with gold. As a souvenir of the Tarawera eruption it is one of the most remarkable that has yet been exhibited.—*New Zealand Herald.*

Improvements in Photography.

Such improvements have been placed before the public in such abundance that another apparatus in this line will be no surprise. It is the invention of Mr. Schwaunenberg, a watchmaker in this city (writes a Hanover correspondent) who was thoroughly educated in the polytechnic schools, and has produced several interesting inventions. His improvement in photographic shutters is made in a field in which, though much has been attempted, no completely satisfactory results have been obtained, and I lay his work before the reader for what it is worth. It may appear a useless refinement to say that in ordinary photography the process is not perfect because the shutter, by falling from above, or passing across the face of the lens, cuts the light off from the plate unequally; but in view of the extensive scientific use of the camera in recording important investigations, the difference between a perfect and defective result becomes a matter of great importance, and every landscape photographer knows how much more desirable light is among dark objects like trees and buildings than in the upper or sky portion of the photograph, which is naturally full of light. It is the main object of Mr. Schwaunenberg's shutter to satisfy this want, but also to provide a bit of mechanism which moves with any desired degree of speed without any jar whatever. To do this he fixed two thin, oblong metal plates moved by roller-spring hinges to the upper and lower edges of a third plate. The two plates, which close and fold as noiselessly as the leaves of a book, are controlled by a bit of mechanism in which force is transferred by a simple principle, which is said by the professors of the Hanover Polytechnic School to be entirely new, and is certainly as perfect and admirable as it is novel. I do not, however, feel authorized to describe it. When adjusted for use the upper plate hangs down across the opening before the lens like an apron, and the lower plate is in a corresponding position beneath. In making the exposure the shutters rise together, the edge of the lower one following so closely upon that of the one above that one scarcely observes that the glass has been exposed at all, but in the process the lower and darker part of the object photographed receives an infinitesimally longer exposure, as it should, than the upper half, giving very desirable results. The plates move with equal rapidity until about one-eighth of a circle remains to be traversed, from which point the lower one moves more rapidly. I am told that the reverse of these conditions usually prevails, and that Mr. Schwaunenberg's improvement is of great practical value.

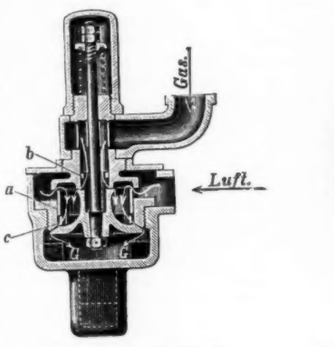

FIG. 7.—MIXING VALVE

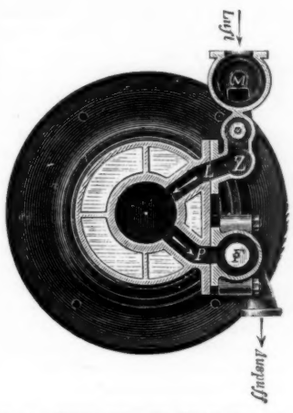

FIG. 6.—VIEW SHOWING CHANNEL FOR INTRODUCING GAS.

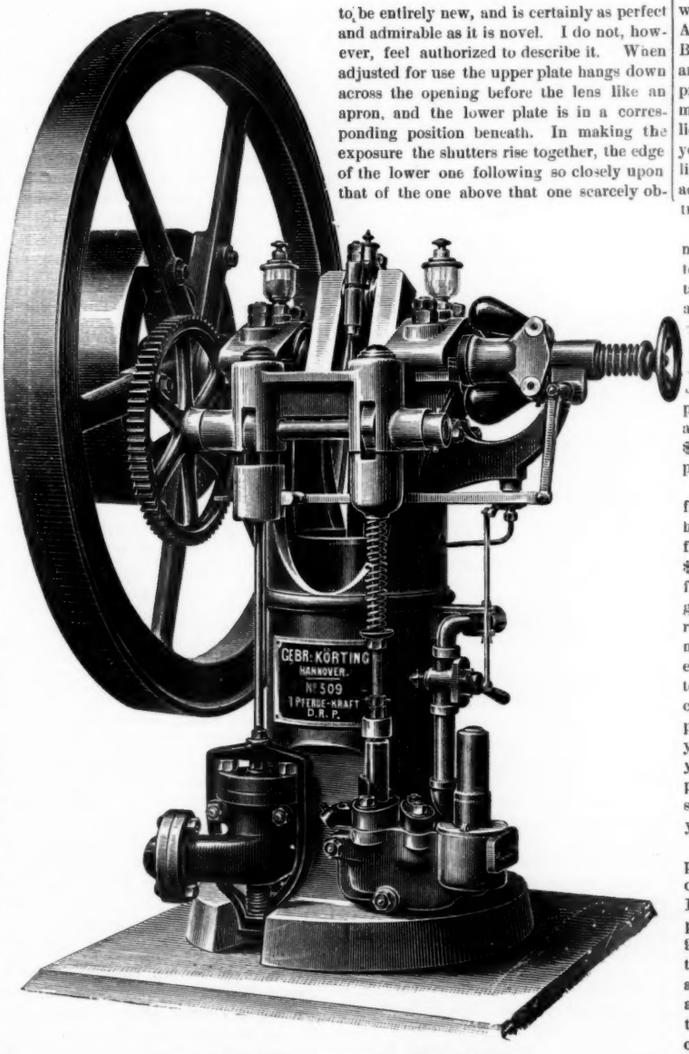

FIG. 5.—FULL VIEW OF THE KORTING ENGINE.

Thrashing by Electricity.

A novel application of electric power has just been made on the estate of the Marquis of Salisbury, at Hatfield. A Gramme machine, driven by water-power half a mile distant, has been attached to a thrashing machine, and the result is stated to be highly successful, a regular, rapid and noiseless power being obtained, together with a great saving of cost. To effect a temporary stoppage of the machine, if necessary, it has been arranged that the current from the leads can be turned from the Gramme machine into a cluster of Swan lamps, so that a short break in the operations does not necessitate any communication with the source of power or stoppage of regular working, while at the same time it gives warning to the men when the current is running.

Going for the Gas Monopoly in Toledo.

A correspondent of the Toledo *Bee* frees his mind in relation to the gas company of that city in the following article :

Before the Committee on Gas last Friday evening, when the aggregation of senatorial pomposity was explaining the comparative "luminosity" of gas and electricity, the whole argument was driven home and clinched by this most-of-all-wonderful piece of information : "That electricity is a luxury intended only for the use of the millionaire, who could pay for all of the light he wanted." A beautiful text for this great philanthropist. But he should have added that "the electric arc lamps have also reached a degree of practical commercial value that make it a most effective competitor in the field of public lighting; and as proof of this I refer you to our present bids for street and city lighting. In this our deliberate action we acknowledge the value and potency of electric light as a competitor."

And they might have also added that "in naming $18 a post per year, we are compelled to acknowledge that we have taken from the tax-payers $20 a year on street lamps alone, and at least three times as much more from public and private consumers than we were fairly entitled to for the services rendered." But they put it this way : "Our hearts are bleeding for the poor, over-burdened taxpayers. Why, see. We save them $20,000 a year on street lighting alone, by naming $18 a lamp post as against $35 for the same post for 1886."

Here again is an open confession that the fountains of human sympathy of these warm-hearted, sympathetic gas gentlemen, were frozen up, and they could easily pocket this $75,000 or $80,000 a year annually taken from these poor overburdened taxpayers or gas consumers, without showing a single ripple of disturbance or conscience in the matter. It was left for the warm rays of an electric lamp to thaw them out, and set them to slobbering over their victims. Before I accept, as one of the poor and overburdened taxpayers, your honeyed words and sympathy, you must refund the $20,000 you confess that you have taken unjustly every year for the past ten years. This would give us our street lights for nothing for the next ten years.

The electric company offer us 2,000 candle power of light for 55 cents a night, and you can only give us 150 candle for 55 cents. Even now, besides, you tax back on our property for delivering this amount of light, 9 posts at $8.50 each, or $76.50, and the electric company furnish everything. It looks as if you would have to save the dear people about $10 a post more before you can give them as much light for a dollar as the electric company offer. Thaw out a little more, and even you, Mr. Gas Company, may be able to see it. Come, get down. We poor tax-payers kind of feel as if we could really enjoy just a little of this new luxury, electric light.

A Reminiscence of Donnybrook.

"Oconomowoc," yelled the brakeman.

"O'Connor may walk, may he?" exclaimed an Irishman at the other end of the car. "An faith, if yez mane me, you'll have a foine time making O'Connor walk whin he's paid $5 for this bit o' pasteboard."—*St. Paul Herald.*

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In a business where profits are large it matters little whether the coal pile is wasted or not. There are hundreds of steam users who waste yearly a large part of their coal pile. They regard all improvements in furnaces, grates, feed water heaters, damper regulators as useless refinements. The administration of electric light companies is perhaps less open to criticism in this particular than all others. Still in how many electric light stations is a record kept of the numbers of amperes on the circuit, or of the power consumed as shown by the indicator? A complete list of expenses and receipts in the various branches of the business would show where retrenchment should be made and in what directions it could be profitably extended. The time will come when every station will be provided with a voltmeter, and by comparison with a list of the difference of potential of each lamp some estimate can be made of the resistance of the line.

There are a number of telephone sets in the State of Texas for sale cheap. They bear the "Pan-Electric" brand.

The Hon. Roswell P. Flower has resigned from the Electrical Commission. Governor Hill has appointed Mr. D. L Gibbens, counsel for the Commission, to fill the vacancy. Mr. Gibbens is familiar with the work of the Commission and will carry forward the work begun by Mr. Flower. We consider it an excellent appointment.

John E. Powell has been appointed Electrician of the United States Treasury, after a competitive examination. The position is a new one, created at the last session of Congress.

It now seems probable that the great telephone litigation of the past several years will be concluded during 1887. The Supreme Court of the United States on Monday granted a motion made last week to advance and hear together the telephone cases—six in number—now on the docket, and ordered that they be set for argument as one case, on January 24, at the head of the calendar.

Pan-Electricity has been enjoined. In the United States Circuit Court at Dallas, Texas, last Saturday, a decision was handed down against Pan-Electric competition in that State, with an order that the whole Pan-Electric system in Texas should be closed out within sixty days. This is another important decision in favor of the American Bell Telephone Company, and its officials are correspondingly happy. A sharp rise in the Bell stock followed the announcement of the decision.

Mr. Charles Selden, superintendent of telegraph for the Baltimore and Ohio Railway Company, is appreciated, it seems, both electrically and politically. The residents of the Fourteenth Ward, in the city of Baltimore, elected him a member of the City Council at the November election, giving him a majority of 750 votes in a ward that had heretofore always elected a member of the opposite party. A gentleman of Mr. Selden's attainments and ability will be a most valuable acquisition to the city fathers of Baltimore.

THE JULIEN MOTOR AND STORAGE BATTERY.

Two trials of the Julien car were made in this city last week on the line of the Eighth avenue surface railway, the car running from Forty-ninth to One Hundred and Fifth streets. The motor is attached beneath the car, and the storage battery placed beneath the seats on the sides of the car. The claim is made that one set of the batteries, properly charged by the dynamo at the stables, will run the car eight hours The car ran off the track once, which was attributed to the fact that the wheels did not fit the rails. It is designed to run the car at the usual speed run by street cars, though its maximum speed is said to be much greater. The car is lighted by electric lamps, and is easily controlled. The superintendent of the line was well pleased with the result of the test. Mr. Julien, of Belgium, the inventor and electrician, is in the city, and was present when the trials were made.

PROPER USE OF ELECTRIC LIGHT FOR LIGHTHOUSES.

It is a great mistake that those who now are introducing the electric light for lighthouses, abandon entirely the advantages to be derived from the ingenious devices first suggested by Buffon in his compound annular prismatic lens, and further perfected by Fresnell, who, by a combination of such lenses placed in front, and the addition of reflectors placed above and below, succeeded in utilizing not only the light lost by being thrown upward in the sky, but also that thrown downward on the foreground, where it is not only useless, but where its glare is always a decided nuisance. This Fresnell system, as used in many of our first-class lighthouses with oil lamps as now constructed, gives a better and more suitable light for the purpose intended than, for instance, the glaring electric light as now in use at Hell Gate.

The following considerations will show why this must be so: Plain electric lights placed on top of a high pole will do well enough in the square of a city where the purpose is to illuminate the space below and confined to the immediate surroundings, as is the case in Union and Madison Squares, New York City, but it is highly improper for seacoast, and still worse for a harbor entrance, where a glaring illumination of the immediate surroundings is not only useless, but a decided injury to navigation. Fresnell was so convinced of this fact that in his first-class system he intercepts the light falling down, by means of reflectors, and sends it to the horizon, where it will do good, by increasing the distance the light will reach, while when falling down it will annoy pilots in the immediate neighborhood. Many New York citizens will surely have found a verification of this assertion when crossing Broadway at night when the crowded street is illuminated by glaring electric lights.

The maximum effect of a coast light can never be obtained when the light is allowed to radiate in all directions, upward, where it is entirely lost, as well as downward, where for a coast light it is injurious. At least 90 per cent. of the rays are thus lost, 45 by being thrown to the sky and 45 per cent. by being thrown down on the foreground. Hell Gate pilots have complained about this, and want it abolished.

It is, however, not the electric light which is there at fault, but the primitive manner in which it has been applied.

WELDING BY ELECTRICITY.

A recent description of the electric welding process of Prof Elihu Thompson in *Engineering* of Sept. 24, has brought forth the following rejoinder from Mr. J. B. Duncan.

To the Editor of Engineering:

SIR: In your issue of the 24th inst. I observe an interesting article on welding by electricity, in which is described a method of welding as carried out by Professor Elihu Thompson, of Boston, and claiming for that gentleman the invention of the process.

I desire, with your indulgence, to draw attention to the fact that I applied, fully eighteen months ago, the principle that there is a greater electrical resistance at a break than at any other part of a conductor, and consequently increased temperature at this point. Since then I have repeatedly (as well as our workmen) welded wires together by electricity, thereby anticipating Prof. Thompson by something like sixteen months.

The practical application of the principle, and one which will readily commend itself to users of incandescent lamps, consisted, on my part, of welding together the ends of broken platinum loops of incandescent lamps, by this means rendering otherwise useless lamps valuable. The method I employ for effecting a union between the ends of broken loops of defective lamps consists in fastening to the whole loop a flexible terminal of a dynamo (either alternate or direct) of sufficient electromotive force to render the filament highly incandescent. I then bring the ends of the defective loop in contact with each other, and at this contact complete the circuit through the filament by touching the other terminal of the dynamo. I then break the circuit at the contact of the broken loop of the lamp, and a welded or fused junction is effected.

The welding is more easily performed with low than with high resistance filaments, for the same size of wire, and takes place so quickly that no damage is done to the glass of the lamp.

I remain, sir, yours truly,
Newcastle-on-Tyne. J. B. DUNCAN.

It is evident that Mr. Duncan did not anticipate Prof. Thompson's invention, as he used—as did many others—the heat of the arc, and not that of incandescence. It does not seem probable that the incandescent filaments of the lamps in circuit, as he describes, could withstand the excessive current necessary to fuse the platinum connections.

The discriminating editor of the Albion *Chronicle* says:

"THE ELECTRICAL REVIEW, New York, continues to flash and sparkle as brilliantly as ever. Everything pertaining to electricity, as a motive power and illuminator, is attractively presented in the REVIEW. This paper is fully illustrated, and is published weekly."

BOOK REVIEW.

We have received from the publishers (William Wood & Sons) a copy of "A Treatise on Electrolysis and its Applications to Therapeutical and Surgical Treatment in Disease," by Dr. Robert Amory.

It is indeed gratifying to those interested in the subject to meet with a book treating of the application of electricity to the healing art, in which the author has not made more or less of a shipwreck on those principles of electricity, the violation of which has so often cast disrepute on the scientific accuracy of medical literature.

It is not to be supposed, however, that this book is perfect in this respect, but it certainly would not lead the reader far astray.

The author begins his task by a rapid but fairly comprehensive summary of those natural laws which govern the physics of electrolysis, emphasizing the hypothesis of Grotthüs, and the theory of electrical osmosis, and the observations of Faraday and Volta, defining those terms which relate to electrolysis in a way to preclude the possibility of misunderstanding on the part of the intelligent reader.

A table of atomic weights is inserted, which is open to criticism from the fact that one very important element (manganese) is entirely omitted, and a number of the other elements have weights assigned to them which are no longer believed to be correct. This table was evidently not compiled from a recent authority.

The author here takes the ground that if the decompositions which take place in an inorganic electrolyte are accompanied by the display of chemical energy, it must also be true that disturbances resulting from the decomposition of an organic electrolyte—as for example a living tissue—will produce the display of some form of energy in the structure of the tissue itself. It is not held that this energy is transformed into electricity, nor does the author contend that such is the case, but some form of energy must result from organic chemical decomposition, whether it is heat, or cell formation, or cell destruction, or transmutation into some other form of energy.

This portion of the book closes with an elaborate compilation of the observations of well-known authors on the electrolytic action of currents on living tissues

The third chapter is devoted to the various forms of voltaic cells best adapted to medical electrolysis. This portion of the book is not intended to be simply scientific, but describes those batteries which it is wise for the physician to avoid, and also those which he will find best adapted to his wants. Ohm's law is stated and illustrated in such a way as to enable the reader to intelligently understand the relations between electromotive force, current and resistance; practical rules are also given as to the best way to couple up cells of battery so as to give the desired results.

In the middle portion of the book the human body is looked upon as a conductor of comparatively high resistance, and the methods of passing a current through it are discussed. The nutrition, life and death, and chemical basis of tissues, and the effect of osmosis on the absorption of fluids in tissues, and the resolution of tumors, the treating of goitre and cancer are fully elaborated.

In the latter portion of the book the methods of measuring electrical currents while being used therapeutically, and also the instruments and apparatus of medical electrolysis, are carefully and thoroughly explained.

Throughout the whole of the volume the author keeps plainly before the reader the idea that the human body, or any portion of it, is an electrolyte in which certain chemical and physiological results are to be accomplished by a known electric current. The book is not inteded to popularize the subject, and is for the purely professional reader.

It is well printed and contains not many typographical errors.

CHICAGO ELECTRICAL NEWS.

A recent invention is thus heralded by an enterprising reporter; and, by way of parenthesis, speaking of reporters, if there is any one class of word butchers who can make a worse mess than an ordinary news reporter when he undertakes to write up a bit of science, it must be the street-corner peanutta man: "It is a system of distributing electricity for lighting and other purposes, which will effect a saving of 95 per cent. in the distributing main wires as compared with the Edison system. In testing the invention, the current for eight hundred and fifty-16 candle power incandescent lights, situated three miles from the dynamo, was carried by a single main circuit wire less than one-quarter of an inch in diameter. It is claimed that to do the same work the Edison system would require more than ninety wires of the same diameter. If the new system can do all that the preliminary tests appear to warrant the inventor in claiming for it, the day of cheap electric lighting is not far off."

The advent of this system will be hailed with joy by the dear public, who, disappointed in that—*those*, rather—battery which is to do incandescent lighting at a rate which will shame tallow dips in the matter of economy, have necessarily to fall back on some invention which will furnish a carrying capacity beyond that of pure copper of several times its cross section. Why the dickens doesn't the chap tell us that this is a system in which an induction coil is run backwards, so to speak, and an alternate current machine furnishes the impulses for the large wire secondary, and that the light current is one of that class of "electricity is life" energies which, when one has studied the theory—the motto—until that is firmly fixed, takes hold of the tin lozenge cutter-shaped handles, dances his money's worth and quits, believing rather with the California fellow:

> "This here electric fluid's hotter'n—well,
> Than scaldin' steam, or puddin' made o' bread;
> They say it's life. Perhaps. I'll never tell,
> But mighty little more 'd a left me dead."

New uses for electrical energy are developing daily. The Volta, on her trial trip across the channel the other day, ran so still that she sneaked up on a sea-gull which was taking a nap on the waves—"rocked in the cradle of the deep," as it were—caught and carried it captive into Dover.

Other possibilities of electricity were recently exemplified in the case of a peasant woman in France, who, returning home in a thunderstorm, felt a sharp shock, but experienced no inconvenience until she took off her head gear, when all her hair fell to the floor.

Now, if we can only open a new industry in the way of catching birds, fish and animals by means of electricity, and train it to act the part of tonsorial artist as well, how much will we have gained? Lightning would do its work as a barber so quietly; there would be no unpleasant indications of dyspepsia, onions or whiskey. Ozone is preferable to perspiration, barbers' cologne, and all those other wet dog perfumes thin-bearded bachelors so well recognize. Our hearts would be set at rest on the question of individual brushes and soap, and lightning would never personate the baldheaded liar who always has a patent hair restorative to sell.

"Boy," said the patriarch of the shop, who was arguing with a bald pate in the chair, "dar, you done open dat door, and blown off my wig! Dat's tree time dis winter you done dat fool trick and loss de sale of a bottle of my haar mix. Don't you do dat nebber no more."

Surrounding the tower of the Board of Trade is a circle of twenty sperry arc lights, which is certainly a beautiful piece of ornamentation, and a really useful beacon to incoming seamen, who steer for it until the lighthouse looms up, the former being much higher than the latter, and also of a form not to be mistaken for anything else. The object of the corona, however, was not to create a beacon for men with short-waisted pantaloons and tarry top-lights, but to light up the neighborhood of the Board of Trade, for the benefit of those who might need such help late at night or early in the morning.

Originally there was supposed to be a contract, but the newspapers have stated that there is nothing binding upon those who verbally agreed to pay the expense, and a claim is set up that more was promised than is being fulfilled in the way of lighting, hence there is more or less squirming when bills are presented. But there is a contract nevertheless, and the lights shine up there every night, rainy or clear, and it would hardly be safe to bet they will be taken down, for the present at any rate.

The Alleghany County Light Company, of Pittsburgh, Pa., is increasing its plant, and changing engines, replacing those heretofore used with two Witherell-Corliss machines. The driving belts for these engines, which are monsters, are from this city. Messrs. Munson & Co. are manufacturing them, and when completed they will each measure 122 feet by 36 inches wide, and contain 366 square feet of the best of leather of a perfectly uniform thickness and quality. Munson & Co. have recently set up an hydraulic press which as a squeezer is unparalleled. The capacity of this press, which has been christened Jumbo, is about 230 tons.

The fat stock show, which comes annually after the exposition—a sort of postscript, as it were, opens to-day. The exhibit, which includes nearly all kinds of "things as eats and things as dies," is to be illuminated by the Sperry company, who have placed 73 arc lights for that purpose.

CHICAGO, Nov. 8, 1886.

BOSTON ELECTRICAL NEWS.

It is quietly rumored that the managers of the "Adonis" Harry E. Dixey combination, are only waiting for the slightest falling off in the attendance to introduce a new and startling transformation. Mr. Dixey has delighted the industrious shoppers by the rapid send-you-home-with-your-bundles-act. The operation, however, consumes some time. It is proposed to bring customers from and return them to their homes by tachitrech electric relays, and a working model is to be shown on the stage. By paying an extra fee patrons of the theater may be provided, after the first of January, with this rapid and pleasant method of attending the play. Letters patent have been applied for, and and a $1.00000000 capital company is at once to be formed.

The Northern Electric Company, Rochester, N. H., of which Willis L. Adams is superintendent and general manager, and Ernest A. Man, electrician, have entered upon the business of constructing telegraph and telephone lines and installing electric light plants.

Sanford, Me., is talking of establishing a central incandescent electric light station.

The N. E. Weston Electric Light Company have installed at the Fells Station, Malden, Mass., factory of the Boston Rubber Shoe Company, a 900 16-candle power incandescent plant, and at the Merrimac Mills, Lawrence, a plant of the same size.

The Suburban Electric Light and Power Company, of Brookline, Mass., composed of persons interested in the Brookline Gas Company, are preparing for the operation of 100 American Fuller Wood arc lights at once, and in the near future the plant will be increased to 300 lights. The contract for furnishing the electric plant has been made with Messrs. Sowdon, Elder & Wright, who have closed contracts with the Westbrook Manufacturing Company, of Saccarappa, Me., and S. W. Fuller & Holtzer, Boston, Mass.

BOSTON, MASS., Nov. 9.

WRINKLES IN ELECTRIC LIGHTING.

[Written for the ELECTRICAL REVIEW by Lewis F. Lyne.]

THE LACK OF PRACTICAL LITERATURE AND DATA.

Some months ago I purchased a book bearing the title "Wrinkles in Electric Lighting," and hastened to congratulate myself that I had found a book made up of such practical matter relating to electric lighting as would be appreciated by those who are engaged or about to engage in operating electric light apparatus. I was, as usual, disappointed, as one by one its pages were turned, and I was thus led to the resolve that my pen should at once be put to work in describing many of the things which the author of the above named book, as well as others, have failed to include in their treatises. So far as the measurement of electrical currents and the history of apparatus for producing light are concerned, the books already published contain that information. The electrical part of Deschanel's Natural Philosophy is as good as any. I shall not, therefore, weary the patience of the reader by going over the ground that has been so well covered, but will endeavor to present a series of practical facts as they have occurred in my experience, as well as that of others in the same line of pursuit.

Central station lighting is a subject which has been very little displayed in the books. A certain foreign author indexes the subject of central station lighting, and from the fact that it refers to a whole chapter on that subject, the one in search of such information turns with eagerness to the page designated, only to find that the author coolly announces that he had intended to write a long chapter on the subject, but for various reasons he was not yet prepared to do so. He had, however, left in the heading, for convenience of inserting such a chapter in a future edition of the book, should one ever be required.

I would suggest that he had better have left in the blank paper also, with the pages all numbered, to avoid any confusion in making up the press work. It is very discouraging for one who is in search of such knowledge to be compelled to plod along and pick it up here and there wherever he can find a crumb. I am often asked by the novice, "What book shall I get which will enable me to gather sufficient information to qualify myself to run an electric light station?" Very little has been said in regard to the details of construction of the dynamo machine and of the contingencies that occur in the regular course of operating. One of the chief reasons for this is that the dynamo is as yet very imperfectly understood. In support of the proof of my assertion, I will refer to a standard author where he says: "An American, Mr. ——, has constructed a gramme dynamo from which one of the two pole pieces has been omitted, and which he therefore calls a 'uninpolar machine' The inventor is understood to regard this absurdity as an important improvement."

He (the author) then goes into a process of reasoning by means of which, together with the quotation of experiments that (to the casual observer) appear to sustain him in his conclusions. But the fact is I now have under my direction no fewer than eight dynamos of the type alluded to by the author. I will say in contradiction of his assertion, that these dynamos which he condemns, have cost during the past two years less than ten dollars for repairs, and in the economy of power they will compare favorably with any other. In fact, the quantity of current generated with a given horsepower by these dynamos exceeds that produced by other machines with an equal expenditure of power in the station I am operating. So we cannot always conclude from what we read in books as to the merits of certain forms of apparatus.

Another serious obstacle that authors have to contend with in the difficulty of giving the necessary information to engineers and others operating electrical apparatus, is the fact that all machines have their defects, and in speaking of them the author is likely to injure the manufacturers. He therefore refrains from speaking of the defects as much as possible.

Each of the subjects connected with central station lighting by arc light apparatus, will be taken up in due course, and I shall endeavor to handle the merits and demerits impartially, and for the edification of those whom I am seeking to instruct. The articles that I contemplate writing will be intended principally for the engineer who has not had the advantage of previous knowledge in this direction and is called upon to erect an electric light station and operate the apparatus, and also for the average mechanic who may be called upon to run the lines and attend machines for supplying shop or factory lights.

My desire is, that in advancing personal opinions, I may succeed in stimulating a healthy discussion of the various subjects treated, in order that the truth may be determined beyond all further controversy.

The matter I have just written is given more by way of introduction than otherwise, but in my next I shall have something to say upon the construction of lines and a proper insulation of the same.

THE BARTHOLDI LIGHTING.

BY PROF. P. H. VANDER WEYDE.

Editors Electrical Review:

In regard to the light of the Statue of Liberty, those in authority have placed the light practically inside a box in such a way that perhaps ninety per cent. of the light is kept in, and only ten per cent. can get out through holes provided for that purpose. The lenses in these holes cannot correct the mistake, as a lens cannot pass more light than it receives, and only can deviate the direction of the rays, while all the light which now shines against the inside of the box is lost, except in the form of heat.

It is likely that this device of placing the lights was the result of the desire to prevent the glare, when the naked light sheds its rays down in the eyes of the pilots in the immediate neighborhood. But in place of shutting it off with blinds all round, this purpose could be equally well obtained by reflectors placed in front below the light. These would act like a screen, and if at the same time placed according to Fresnell's method, in such a position as to reflect it toward the horizon, it would add to its carrying capacity.

The best method for obtaining the full benefit of a series of arc lights placed in a circle would be to place them in the circular focus of the curved surface generated by the revolution of a parabola around a line perpendicular to its axis, and situated outside its vertex at a distance from its focus equal to the radius of the circle upon which the arc lights are placed. A paraboloid of this form, when used as a reflector by being polished internally, would have the immense advantage of throwing all the light otherwise radiating toward the surface of a sphere, into one horizontal plane, and at a distance exhibit a measurable size, in place of appearing like mere luminous points

I am not aware that such a form of paraboloid reflector has ever been produced, but surely we have the men who can do it, and will do it when the new problems involved in the proper use of electric lights for the purposes of navigation have to be solved, as surely they will. It must not be lost sight of that the art of electric illumination is as yet only in its infancy, and when we consider what developments have been the consequence of many other inventions and discoveries, we will not fail to realize the grand future in store for this most glorious problem of changing night into day.

A novel method of applying an electric current to the body forms the subject of a patent granted to the agent of Senor Pumariega, of Avile, Spain The inventor steeps flannel in a bath composed of equal parts of oxide of iron, copper, zinc and tin, mixed in fine powder in weak gum water. The flannel thus takes up a quantity of the metallic oxides, which are excited by the perspiration of the body, which is thus subjected to a weak but constant electric current.

Telephonic News

⁂ Seems as if Hallowell, Me., would be a good location for a telephone company.—*Commercial Bulletin.*

⁂ At a college examination: "What is the best insulator?" asked the Professor of Physics. "Poverty."—*Tid-Bits.*

⁂ The subscribers of Elmira, N. Y., know what it is to be without their telephone for a day, and all admit that it was greatly missed. A fire in the cable box, caught from an electric light wire, caused the trouble.

⁂ The West Coast Telephone Company, of San Francisco has filed articles of incorporation. It is formed to do a telephone business in California, operating the Pan-Electric system. The capital stock is $100,000, and the directors are Geo. C. Perkins, Geo. Hearst, Jas. W. Whiting, W. F. Good, C. C. Clay, Irwin C. Stump, Jefferson James, C. W. McAfee, and J. P. Meux.

⁂ The Chesapeake and Potomac Telephone Co. has written to the Commissioners, charging that a Pan-Electric telephone has been placed in the Emergency hospital in connection with their lines, which they claim is an infringement of their rights. Mr Miles, superintendent of the District Telephone Service, says the telephone in question was put up in the hospital two years ago, and is not connected with the general system.

⁂ In the new play brought out by M. B. Curtis, entitled "Caught in a Corner," this very funny actor makes use of the telephone in one of his most amusing scenes. He is in a great hurry to get the Board of Trade to cover his loss, and his conversation with "central," and his getting the wrong connection, are features that occasionally enter into the life of every telephone subscriber, particularly when he is in a hurry.

⁂ For the three months ending September 30th, 1886, President Mulvane, of the Missouri and Kansas Telephone Company, makes the following statement of business, with quarterly dividend of $1 per share:

Gross earnings	$54,799 45
Gross expenses	30,111 05
Net earnings	$24,688 40
Dividend No. 7	10,000 00
Balance to surplus account	$14,688 40
Cost of construction during the quarter	$13,330 43
Subscribers added during quarter	124
Miles toll line built	84

⁂ The girls at the telephone office take exception to a paragraph in yesterday's *Guardian* intimating that Cupid has raided less extensively in their ranks than elsewhere. We are informed that during the past three years five of the girls and two of the boys connected with the central office have been married, and two girls from the branch office, and they all married well, too. We are glad to hear of it. Our misapprehension probably arose from the fact that three of the prettiest young lady operators, who have been longest in the service, are there yet, a fact which does not speak very well for the good taste and discernment of the young men of Paterson.—*Paterson (N. J.) Guardian.*

⁂ A Philadelphia exchange in its mention of Henry Bentley, the president of the Philadelphia Telephone Company, says: "Mr. Bentley has always maintained his friendship for the electrician, and when Edison devised that curious and now forgotten toy, the phonograph, he sent the first rudely constructed machine to him. It was exhibited in Mr. Bentley's office at Third and Chestnut streets to delighted parties of ladies and gentlemen. It was a curious sight to see Mr. Bentley bending over the machine and declaiming into the funnel passages from Longfellow or Whittier, and still more curious to hear them repeated in a shrill, unearthly tone, as the cylinder, covered with strips of tinfoil, was slowly revolved. Mr. Bentley possesses all kinds of curious letters written to him by Edison, and many of them illustrate the inventor's eccentricities. Some of them begin at the bottom of the page instead of the top; some of them are written in circles, and many of them are inscribed by Edison's electric pen and other contrivances. It was during the electrician's early struggles with the telephone that Mr Bentley suggested to him a method of decreasing the waste of battery power. At that time the battery power was always 'on,' and Mr. Bentley suggested the use of a button on the side of the apparatus by which it might be thrown off. Edison adopted this, and out of compliment named it the 'Bentley Button.' It was afterward superseded by the arm on which the phone is hung, causing it to work automatically."

⁂ Some important changes, in the interest of convenience, both to the public and the operators, have recently been effected in the local telephone exchange in the city of Worcester, Mass. The general office has been moved down into the room on the second floor, formerly occupied for the trunk line switchboard, so that persons having business with the exchange now have to climb only one flight of stairs. One operator's table has been placed in the general office, for the use of patrons; and an instrument especially adapted to long distance communications, has been provided in a small private room, where the visitor can be alone. The office is very conveniently arranged; and when contemplated decorations have been made will be very handsome. On the upper floor some important changes have been made, in the interest of increased efficiency of service. The switchboards have been brought into compact space, so that at noon and night, when the number of operators is reduced, one operator can sit between two boards and readily manage both of them. The cables leading out to the street lines have all been re-arranged on a new plan. The trunk line table, with its connections all over New England, has been placed in the main operating room—a change which is found to work to advantage to all concerned. Under the new division of the territory of the New England Telephone and Telegraph Company, Worcester is in the Western District and under the superintendency of the assistant general manager. Mr. J. B. Hunt is the local manager.

The Telephone Pole Contest in St. Louis.

The Court of Appeals in St. Louis affirmed the judgment of the Circuit Court in favor of the Bell Telephone Company in its contest with the Board of Public Improvements relative to a permit for poles on the streets. The board had withheld a permit for the use of the streets, on the ground that the company had refused to comply with certain conditions. The question to be determined was whether the Board of Public Improvements had the power to oblige a corporation which may desire to erect telephone poles and establish telephone wires in the city to enter into a stipulation to grant to any other company requiring electric wires for its business the right to use one or more cross-bars at an annual rental. The board was empowered, says the Court of Appeals, by ordinance to make laws and regulations for the transaction of its own business, but it had no power to establish such regulations in respect of telephone companies as those complained of by the Bell Company. The Circuit Court sustained the position taken by the Bell Company and ordered a peremptory writ of mandamus to issue against the Board of Improvements. The Court of Appeals affirms that decision.

⁂ Justice Miller, of the United States Supreme Court, inquired of Mr. E. N. Dickerson, of the Bell company (who appeared before the court to ask that a day be set to try the several telephone cases), as to the status of the United States suit. The reply was, "that suit is not in court yet;" and Mr. Dickerson gave the distinguished judge a brief statement of the question involved in that suit.

The Telephone Cases.

AN EFFORT MADE TO HAVE THEM HEARD IN FEBRUARY BY THE SUPREME COURT.

Motions were made in the United States Supreme Court last week to advance and hear together immediately after the February recess all the cases now on the docket of this court which involve the great telephone controversy. Counsel stated to the court that the records in these cases comprise 25,000 octavo pages of printed matter, and that the argument, if all the cases be heard together, will occupy a week or more. The numbers and titles of the cases are as follows:

No. 113 Amos Dolbear *vs* The American Bell Telephone Company; appeal from the Circuit Court of the United States for the District of Massachusetts.

Nos. 667 and 668. The Molecular Telephone Company *vs.* The American Bell Telephone Company; appeal and cross-appeal from the United States Circuit Court for the Southern District of New York.

No. 1092 The Clay Commercial Telephone *vs.* The American Bell Telephone Company; appeal from the United States Circuit Court for the Eastern District of Pennsylvania.

No. 1,164. The People's Telephone Company *vs.* The American Bell Telephone Company; appeal for the United States Circuit Court for the Southern District of New York.

No 1,165. The Overland Telephone Company *vs.* The American Bell Telephone Company; appeal from the United States Circuit Court for the Southern District of New York.

The court took the motions under advisement. The records of these cases are the most voluminous ever presented to the court. Copies enough of the record to supply all the Justices in the single case of the People's Telephone Company against the American Bell Telephone Company occupy nearly fifty cubic feet of space.

Set Out to Dig a Subway.

A NIGHT RAID ON BROADWAY ON A PERMIT OF THE VINTAGE OF 1883.

In May, 1883, the New York Underground Telegraph Company was incorporated and empowered to lay wires in conduits underground outside of this city. The articles of incorporation also gave the company permission to lay wires in this city if they first secured a permit from the Commissioner of Public Works. In July, 1883, Corporation Counsel Andrews gave it as his opinion that the company, under its charter, had a right to open the streets and lay wires. Three days later, July 10, Commissioner Hubert O. Thompson gave the company permission to go to work. Recently the company notified Commissioner of Public Works, Gen. Newton, that they intended to open Broadway at Rector street at 10 o'clock that night, and asked that an inspector be detailed to supervise the work and see that the provisions of the law were obeyed. The company enclosed a certified check for $160, a cent for each of the 1,600 feet they intended to open, and a bond in $50,000 which had been approved by Comptroller Lewe.

Superintendent William H. Johnson, of the Hotel Brunswick, and 100 laborers in the employ of the North American Telegraph and Electrical Company, a branch of the New York company, began to dig up the street in front of Trinity Church at 8 o'clock that night. They had only removed a half dozen stones when two policemen swooped down on them and arrested Joseph Harderbolt, one of the laborers. Superintendent Johnson protested against the arrest, and showed Hubert O. Thompson's permit. When the policemen told Johnson that the permit was worthless and insisted on taking Hardenbolt to the Liberty street station, Johnson said he would go too. He dug up one stone with a crowbar, and was promptly arrested.

Contractor John McQuade followed the prisoners to the station house and gave bail for their appearance in the Tombs.

The company insist that they have obeyed the law in every particular, and will fight the case to the end.

The Telephone Fight in Rochester.

A number of the telephone subscribers of the Rochester, N. Y. exchange are holding indignation meetings to oppose the change of rate in telephone rental from regular annual rent to the toll system. Mr. W. M. Mallet, manager of the exchange, on being interviewed, said:

"The fact is just this, that the people do not understand the new system. Business men have an impression that each message sent through their telephone will cost them ten cents. Now this is not so. By the new system we charge $50 for a telephone, which gives the subscribers the privilege of sending 500 messages. A subscriber knows about the number of messages he sends a year. If he sends 1,000 a year we charge him $75. Now he makes the contract for a certain number of messages. Any outside party who uses his telephone pays 10 cents; this the subscriber has, and of course takes one message from the 500 he is entitled to. After he has used up the 500 allowance (or whatever his allowance may be) he pays the company a certain amount for each message, which ranges from 2 to 6 cents each. The subscriber, if he collects outside messages enough, can in many cases pay for his 'phone' and get his messages free."

"How will this system affect large business houses?"

"It will give them better service than ever before. The wires will not be taken up by outside parties who in many cases use it to gossip over. Last month we had over 15,000 unanswered calls. Many of them were of importance, but they could not be answered on account of the 'busy wires,' which were made so by the use of non-subscribers. A business man can make a contract for 2,000 messages per year. If he does not use that number we give him a rebate on what he does not use, and all messages over that amount cost him 2 cents each."

"Suppose a man makes a contract for 2,000," continued Mr. Mallett. "His service will cost $110. He lets his 'phone' to 500 non-subscribers, which nets him $50 and he has still 1,500 messages for his own use and his 'phone' is costing him just what it did at the old rate, $60. If he only uses 500 of the 1,500 messages to his credit we deduct $35, which makes his telephone cost him but $25 for the year. We also make special rates to subscribers of over 2,000."

"I am satisfied that the service will be far more valuable under the new system than under the old," said Mr. Mallet. "It proved so in other cities. I feel certain that the business men do not understand the new system, and when they do they will be satisfied with it."

New Electrical Organizations.

The Standard Light and Heat Company, Chicago, Ill., has been incorporated. Capital stock, $500,000. Harrison J. Barker, and others, incorporators.

The Potsdam Electric Light and Power Company, Potsdam, N. Y., has been incorporated. Capital stock, $22,000. Wm. R. Weed, and others, incorporators.

The People's Electric Light Company, Greensburg, Ohio, has broken ground for its new plant. The plant will cost $17,000. Two engines and two dynamos will be used.

The Electric Light, Heat and Power Company, Carbondale, Pa., has been incorporated. Capital stock, $30,000. Treasurer, Morris Moses.

The Norwalk and South Norwalk Electric Light Company, Norwalk, Conn., has been incorporated. Capital stock, $50,000. Chas. E. Dustin, Hartford, and others, incorporators.

The Suburban Light and Power Company Boston, Mass., has been incorporated. Capital stock, $30,000. Robert Amory, and others, incorporators.

The Corry Electric Light Company, Corry, Pa., has been incorporated. Capital stock, $50,000. Treasurer, C. G. Harmon.

The Mutual Electric Manufacturing Company, New York city, N. Y., has been incorporated. Capital stock, $100,000. Edward R. Knowles, and others, incorporators.

The New York Electric Mail Box Company, New York city, N. Y. Capital stock, $50,000. Charles H. Parsons, and others incorporators.

Attempt to Wreck one of the Police Alarms in Boston.

A bold but unsuccessful attempt was made by a gang of young hoodlums in South Boston to wreck box 41 of the police alarm system in division 6. Ever since the introduction of the system the boxes have been a terror to evildoers, and while old offenders fear them too much to tamper with them, they have tried at several times to coax the younger members of "the gang" to disable the boxes, but so far all efforts to injure them to any extent have failed, as they are constructed with wonderful strength. On this occasion a determined effort was made by a crowd of young roughs, whose ages run from 14 to 16 years, to smash box 41, at the corner of Fourth and Foundry streets. They hammered the box with cobble stones and bricks, but the little iron case stood the strain until John McEvoy procured a paving block and gave it a tremendous blow, breaking off a sliver from the bottom edge of the iron door, but not injuring it to such an extent as to interfere with its working. Early in the evening Officer L. P Fernald secured Thomas Powers and Joseph Haley, who participated in the offense, and started out to secure McEvoy, who did the damage with the paving stone. At 11 o'clock a call for the patrol wagon came in from box 26, which is located at the red bridge on the Old Colony railroad, Washington Village, and it brought in McEvoy, who was found at his home, 9 Gustin street. He was locked up with Powers. Haley, who will be used as a witness, was not held. Other arrests are to follow. This is the first test of any serious nature wherein the boxes of the new system have been tried as to strength and powers of resistance, and the result was extremely satisfactory. The box was in good working order all night. To-day a new door will be put on the box.

The Locomotive Engineers.

The Brotherhood of Locomotive Engineers is the banner labor organization of the country. No similar body commands the respect that it does. It attends exclusively to its own business, studies exclusively its own interests, and handles its affairs with admirable discretion and wonderful success. It gets what it wants because it never asks for more than its rights. Thrice armed is he whose cause is just, appears to be its inspiring motto.

It is not every labor organization that would be addressed at its own private convention by men of the stamp of Mayor Grace, Governor Abbott, Rev. DeWitt Talmage and President Chauncey M. Depew, as the locomotive engineers were at New York this week. And it is not every labor organization that can be spoken of in such words as those used by President Depew in his speech to the assembled engineers. He said in substance that "there was not a railway president in the country who would refuse admittance to his office of members of the organization; they knew that the engineers always kept their contracts and commanded the respect of their employers."

The locomotive engineers' brotherhood is flourishing, just as those who have watched its dignified and business-like treatment of all its private affairs and of all its relations with employers might reasonably expect. The trite saying that nothing succeeds like success should be borne in mind by other labor societies, and the methods and aims of the brotherhood of locomotive engineers, which has achieved unparalleled success as a labor organization, should be studied carefully by other bodies of wage earners.—*Railway Review.*

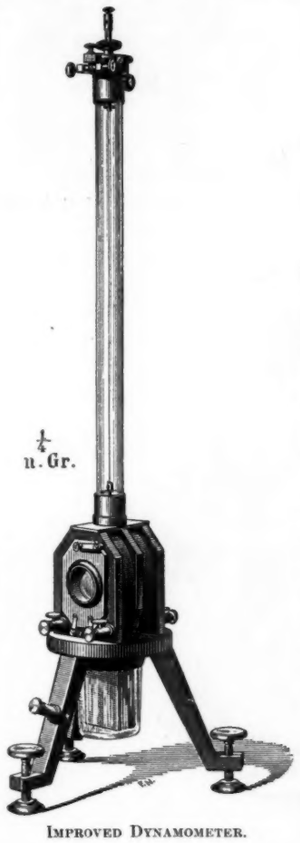
.... A new process of rendering paper insensible to the action of water and atmospheric changes has been patented in France. A sheet of paper is covered on the wrong side with a thin layer of gutta-percha, which is afterward spread with paper, linen, thin pasteboard or similar matter. The whole is heated and pressed. Under the influence of heat the gutta-percha becomes softened and unites firmly the two surfaces between which it has been placed. This prepared paper is of special value in art work.

Dynamometer of Hartmann & Braun.

Experience has demonstrated that the dynamometers of Weber having two points of suspension or two threads, are not sufficiently sensitive for certain uses the derangement of the suspension threads making the results uncertain. Messrs. Hartmann & Braun, of France (represented here by Messrs. Queen & Co., of Philadelphia), have devised an improved apparatus wherein the ring or mirror is suspended by a single thread, which is provided with a micrometer scale to indicate the degree of torsion.

Electric Headlight Company.

The Edwards Electric Headlight Company organized in Richmond, Ind., October 21, to manufacture the electric headlight invented by Edgar A. Edwards, and sent out of Cincinnati on the Little Miami engine the night before, elected the following officers: President, James W. Carpenter, Dayton; Vice President, J. H. Kibbey, Richmond; Treasurer and Secretary, J. W. Carpenter, Jr., Dayton; Electrician and Superintendent, Edgar A. Edwards, Cincinnati. These gentlemen, with the following, compose the Board of Directors: C. W. Chamberlain, Dayton; Henry E. Robinson, Benjamin Johnson, M. Cullaton, Richmond; Harry King, Indianapolis. The capital stock is put at $2,000,000, divided into $50 shares, and it is claimed that every dollar of it is subscribed.



IMPROVED DYNAMOMETER.

An Electric Man.

Eugene Tyler, of Adairville, Ky., is a wonderful young man whose body seems charged with electricity. He comes of a good family, is well educated, and is variously described as being a spiritual medium, a living walking battery, a lightning generator, and as having fire enough in him to run a locomotive. He rubs his hands together, places them on the shoulders of a subject, and instantly has his victim under his influence No one has yet been able to defy his power, and no collusion between him and a subject has yet been discovered. He is said to be able to light the gas by a spark of electricity sent from his finger tip when two feet from the gas burner.

A Startling Figure in White at the Elbow of a Train Dispatcher.

Peter Kennay, employed as telegraph operator at Ingram Station on the Pittsburgh, Cincinnati & St. Louis Railroad, had an adventure at an early hour in the morning that he will not soon forget. He was at his instrument about 1 A. M. when he heard a noise as of some one trying to open the door, but thought nothing of it, nor even looked up from his work until startled by a touch on his coat sleeve. He turned partly around, and to his horror saw a tall, gaunt figure, dressed in white with a long knife in hand, standing directly over him. He cleared the slight railing surrounding his desk at a single bound, but the strange visitor was between him and the door and he began pleading for his life. The specter made no move to follow him, except to prevent his escape by the door. As the ghostly creature made no advance the operator in a measure recovered his self-possession and stood on the defensive in the furthest corner of the room. The apparition then seated itself in Kennay's chair before the telegraph instruments, keeping a close watch on the movements of the operator. They maintained the same relative positions for nearly an hour, during which time trains on the railroad approaching that point were brought to a standstill. One or two trains had been stopped for the signal to go ahead. The crew of the first train finally walked up the track to the telegraph office to find out the cause of the delay, when they discovered the operator's predicament and subdued his captor after a desperate struggle. It was subsequently learned that the strange visitor resided at Sheridan Station, nearly a mile away, and had escaped from his home about midnight.

Ghastly Experiments.

A ghastly pantomime, recalling to mind Poo's narrative of the galvanizing of a mummy, was enacted on Monday at the Practical School of Surgery, where the bodies of Frey and Riviere, as already stated, were placed at the disposal of the surgeons to experiment on. A number of experiments were made, among them the following: To re-establish the circulation in the severed heads, the veins were injected with blood taken from a living animal. The skin of the face, previously livid, became charged with color, the lips recovered their natural red, the cheeks filled out; irregular movements agitated the skin, and the face resumed the appearance of life. Electric currents were passed through the facial nerves, and the contractions of the face were noted.

There were, however, no results in the slightest degree indicative of any restoration to life or consciousness. The nerves shortly ceased to betray any sensibility, and it was evident that all perception and sensation was at an end.—*Galignani's Messenger.*

.. The New York Underground Telegraph Company, whose manager and workmen were arrested several days ago at Broadway and Wall street, where excavations were about to be made for the purpose of beginning operations of the company's business, has begun proceedings in the Superior Court against the Police Commissioners. Argument was heard yesterday by Judge Ingraham upon an order to show cause why an injunction should not be granted to restrain them from interfering with the company and its employes and officers, in the prosecution of their work for the purpose of laying underground wires, including the opening of streets. Corporation Counsel Lacombe, in opposing the application, contended that it had already been decided that the court would not interfere with the police in the discharge of their duties, imposed upon them by statute, in a case of this character. If this company had any rights at all it had lost them by non-user. Judge Ingraham, in reserving his decision, intimated that he was the last Judge in the world to apply to for an injunction to restrain the police authorities from arresting persons committing any crime.

TELEGRAPHIC

.... The Postal Telegraph Company has opened five new offices at Wilkesbarre, Pa.

.... Forty-one years ago the telegraph had begun in Washington and ended in New York.

..... A special telegraph line is being built by the Lake Shore Railroad Company between Bessemer and Ashland.

.... The Empire Electrical Manufacturing Company, of Brooklyn, has been incorporated.

... A brakeman on the Delaware and Hudson saluted an excursion party with the warning, "Gents, take partners for the tunnel."

..... It is stated that the North American Telegraph Company have made arrangements with the Canadian Pacific, Baltimore & Ohio, the Bankers' and Merchants', United Lines, Postal Telegraph and the Mackay-Bennett systems, and will lay between 1,200 and 2,000 miles of additional wire next spring.

.... The Western Union Telegraph Company have arranged to build another line between San Diego and San Francisco. The new line will run along the route of the California Southern Railroad from Colton to San Diego, and it is expected that it will be in working order inside of sixty days.

.... The Kansas City and Pacific Telegraph company. The purpose of this company is to construct and operate telegraph lines in Kansas and other States. The meetings of the company's directors shall be held at Parsons Directors: E. H. Edwards, Lee Clark, E. D. Stevens, H. H. Brown, and C. H. Kimball, of Parsons. The capital stock of the association is fixed at $500,000.

.... Mary E. Fleming, of Wooster, obtained a judgment in 1845 against Gen. Thomas T Eckert, General Manager of the Western Union Telegraph Company in New York City, for $2,250 for alleged breach of promise to marry. The judgment was returned unsatisfied, but was kept "alive" in favor of the plaintiff, who is now Mrs. John Bartol, until last June, when a motion to quash the services in the case was sustained by Judge Parsons. Steps are now being taken to reopen the case, reverse the decision and collect the judgment.

.... The vault burglar alarm, invented by Grah, Bros., of Toledo, is a most ingenious contrivance. An attempt to open the door of the vault, or to cut through the filigree iron work that forms the panels, or to break the glass in the door, instantly establishes an electric circuit, and the superintendent is notified by the bell that a burglar is at work at the vault. The fourth wire in this most ingenious system is connected with an almost noiseless indicator near the bottom and a button near the top of the elevator shaft in the vault, and is used in giving signals for the lowering of bodies from the chapel to the vault at certain intervals in the religious services. Messrs. Grah Brothers have certainly displayed rare inventive genius in perfecting this most admirable system of alarm for cemetery receiving vaults.

.... The system of communication by sun flashes from mirrors has been lately used with marked success by Lieutenant A. M. Fuller, the U. S. signal officer on special service in Arizona. Signals were flashed by mirrors for distances ranging from five to forty miles. A trial message of twenty-five words was sent over a line 200 miles in length and an answer of the same length received at the starting point in twenty minutes. Another test which resulted very satisfactorily, was signaling 300 words twenty-five miles in a short space of time. A message of twenty-five words was recently signaled from Gen. Miles, at Tubac, A. T., to Lake Valley, 400 miles distant, and an answer of twenty-seven words returned in four hours and ten minutes.

ELECTRICAL AND SCIENTIFIC

* * The Western Union Telegraph Company is rebuilding several of its lines in Nevada.

* * "Did you go for a vacation this summer, Smith?" "Oh, yes." "How did you manage your business affairs?" "I took my advertisement out of the paper until I returned, so there wasn't any business to manage. Great scheme, eh?"

* * A balloon of colossal dimensions, and said to be capable of being guided at will, has been for some time in course of construction in Berlin. The balloon is 500 feet in length and 50 feet in diameter. The total weight is about 43,000 pounds, the envelope and netting alone weighing 10,000 pounds. The propelling machinery consists of two steam engines of 50 horse-power each, and the entire cost is estimated at £5,000.

* * One result of recent experiments with oil for smoothing the surface of the sea during stormy weather is that inventors are turning their attention toward improving the methods of applying the oil. A device recently patented is a floating distributor, consisting of a case containing two compartments, one of which serves as a buoyant chamber, while the other is perforated, and receives and distributes the oil, which is supplied to the distributor through a supply-tube.

* * A new laboratory-burner, devised by a Detroit inventor, appears to be both simple and efficient. The base of the burner is provided with a stationary needle-valve surrounded by a vertically adjustable jet-tube with a conical aperture controlled by the valve. Arms extending upward from the jet-tube support a vertically adjustable mixing-tube, constructed so as to close the upper end of the jet-tube when desired. The proportions of gas and air, as well as the size of flame, may be regulated by a simple rotation of the jet-tube upon the base.

* * The London *Engineer* states that germanium, the new element discovered by Dr. Clemens Winkler, has a melting point somewhat lower than silver—that is, about 900°—and at a temperature little higher than this it appears to volatilize. It crystallizes in octahedra, is extremely brittle, has a perfect metallic luster and a grayish-white color. Its specific gravity is 5.469 at 20.4°. It is insoluble in hydrochloric acid, is readily dissolved by aqua regia, is converted into a white oxide by nitric acid, and into a soluble sulphate by concentrated sulphuric acid. Determinations of the atomic weight of germanium were made by estimating the percentage of chlorine in the chloride, $GeCl_4$, and the number 72.32 was obtained as the mean of four experiments, this number agreeing closely with the atomic weight of Mendelejeff's ekasilicium.

* * A dispatch from Chicago states that Judge Blodgett has ordered that all the possessions of the Bankers and Merchants' Telegraph Co., as well as the Board of Trade Telegraph Co. property, be turned over to Mr. E. S. Stokes, or his representative. Col. Robert G. Ingersoll represented Stokes and others, who are owners of all the judgments against the Bankers and Merchants' Co., which was conveyed some time since to the United Lines Co. The Board of Trade Telegraph Co. was bought up by Stokes at the New York sale. The latter company's lines had, however, been leased to the Bankers and Merchants' Co. Judge Blodgett declared this lease forfeited for failure to comply with the rental conditions, and Stokes now comes into possession. Parker, as receiver, is to pay the Board of Trade Telegraph Co. $4,000, and the question of rentals due the latter company by the Bankers and Merchants' Co. is referred to Master in Chancery Sherman.

The "C. & C." Battery.

The battery illustrated on this page is designed especially for running the "C. & C." motor, which is so rapidly gaining in favor wherever introduced. The battery is also applicable for all purposes where a powerful battery is required. It consists of two cells in series, the electrodes of whichare mounted and balanced by a spring, so that they can be conveniently raised and lowered by a lever on the outside of the box, which remains in any position, giving any desired depth of immersion; the depth of immersion regulating the current supplied, and consequently the power of the motor and the speed of the sewing machine. Each battery jar is made in the form of a pitcher with a handle and spout, and holds one and three-quarters quarts of solution. The battery charge consists of two cakes of solid material weighing 1½ lbs. each, put up and supplied by the company in packages wrapped in tinfoil. The battery is started or renewed by simply pouring out the exhausted solution from the jars, placing one cake of compound in each jar, and then filling each jar with water in which the cakes readily dissolve. This can be done with the greatest convenience, because the electrodes are so arranged that when the lever is at its highest point they are clear of the jars, permitting the jars, which then contain nothing but exhausted solution, to be easily drawn out of the box by their handles. The manufacturers state that one charge will give 200 volt-ampere-hours, and will run a shuttle sewing machine at full speed and do 600 yards of sewing, or 300,000 stitches, which is equivalent to two weeks or more of family sewing.

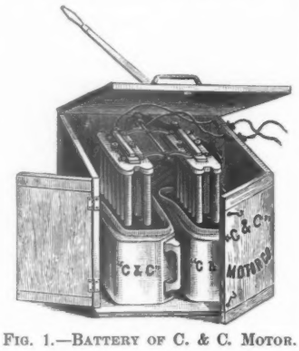


FIG. 1.—BATTERY OF C. & C. MOTOR.

FIG. 2.—ILLUSTRATING USE OF MOTOR.

Its character and capacity as given by the "C. & C." Company are as follows: Size, 8 by 12 by 12 inches. Electro-motive force, 3.9 volts. R sistance, .06 ohm. Gives 8 to 10 amperes with motor, when running average sewing machine at full speed. Gives 8½ amperes with motor running at 1,200 turns per minute. Gives 20 amperes through motor, with the armature held still. Under these conditions the motor pulls 6 lbs. at circumference of pulley, 1½ inches in diameter. Battery will maintain 15 amperes if required.

** Sneuzer had a cousin, by name Pike Artington, who worked in the armature room winding. There is a gauge for each size, and if the finished armature is too large for the gauge the space between the pole pieces would have to be made larger. The first armature Artington finished was too tight for the gauge, whereupon he proceeded to file the gauge. It is whispered that a neighboring lunch-room has enlarged its facilities, owing the increase of custom whenever filing the gauge is mentioned.

The President of the New York Electrical Subway Commission Resigns.

Hon. Roswell P. Flower has resigned his position as a member of the Electrical Subway Commission. In a letter to Governor Hill explaining his action, Mr. Flower says:

To the Hon. David B. Hill, Executive Chamber, Albany, N. Y.

DEAR SIR: Nearly six months ago you did me the honor to appoint me a member of the Board of Commissioners of Electrical Subways for this city. The Board was at that time disorganized by the long illness and death of its president; it had reached no conclusion in regard to the novel and difficult problem it had to solve; its authority was questioned and its powers made light of by the great corporations operating electrical conductors; it was besieged by the holders of alleged patent rights to devices for underground electrical accommodation, each of whom was positive that no other device than his own had the slightest practical value and threatened by grantees of franchises for the building of conduits which had never been acted on; and its work was made more difficult of accomplishment by the insinuations and accusations which, through the misrepresentations of disappointed speculators, daily found their way into the press of the city.

At that time and under those circumstances I conceived it to be my duty not to refuse to do the work which came to my hand, but that I was bound as a citizen anxious for the well-being of New York and for the carrying out of the laws of the State, to accept the responsibility you tendered me, even though I did so—as was the case—at great personal inconvenience and with disinclination.

To day the problem has been solved. A general plan has been sketched out and a responsible organization has been found ready to pledge itself under heavy penalties to carry it into effect. Every precaution has been taken to guard for all time to come the interests of the city and of the electrical companies. Two miles of conduit with accommodations for fifteen hundred miles of wire are almost completed. One mile of wire belonging to the most important service in the city—the Fire Department—is successfully working within the subway.

It has been substantially demonstrated that no great electrical difficulty is involved in the burial of the wires, but that the only question to be settled is as to the relative merits of different conduits looked at as mere protecting coverings to afford security from pernicious underground surroundings and convenience in handling and distributing the conductors of the electric energy; and thus the conflicting and fallacious claims of those who so long attempted to befool the Board have been set at rest. Repeated decisions of competent courts have firmly established the constitutionality of the law under which the commission is organized and have done away with the pretensions of those who had it in their power to promote the building of subways, but who refused to do so until it seemed that the end would be attained without them.

Finally the great electrical companies have come to the support and assistance of the Commissioners. Instead of disputing our authority they now uphold our hands, and we have every assurance that they are preparing cables, and that within sixty days a very large number of poles will voluntarily be taken down in Sixth and Third avenues, two of our most crowded thoroughfares. The working of the law is thoroughly inaugurated and insured, and all that remains to be done is to carry out, extend and complete what is already under way.

I am convinced you will have no difficulty in selecting a Commissioner more desirous and deserving of the office than myself, who, in connection with those who served upon the Board from its organization, and with the capable and energetic assistants we have drawn about us, will be able to carry to a successful termination the undertaking devolved upon the Board by law. My private affairs demand more of my attention than I have for some time been able to give them. I therefore respec fully resign the office with which you entrusted me, and again thanking you for your consideration, remain

Your obedient servant,
ROSWELL P. FLOWER.

No. 52 Broadway, New York,
November 6, 1886.

Commissioner Jacob Hess said of Mr. Flower's resignation: "This is a complete surprise to me. No doubt the reasons alleged by Mr. Flower for his resignation are the true ones; yet I am sorry to see him go out. He has done good service on the Board and won our esteem and respect. The work will not be hindered by his resignation. No doubt Governor Hill will appoint a successor, and in the meantime we will continue to dispose of such business as may come before us."

At a meeting of the Subway Commission Saturday afternoon a resolution was passed ordering the company having the contract to begin the work of laying down the wires in Sixth avenue on November 15, and giving them forty-five days in which to complete the task.

Counsel Gibbons reported that the State Comptroller had informed him that he had about money enough to pay the Brooklyn Commissioners, and hoped to be able to pay the salaries of the New York Commissioners very soon. The explanation of this report is that since the amicable arrangement between the Construction Company and the electrical companies was effected the latter have withdrawn all their hostility to the Commission and its work, and will now pay the assessments levied upon them under the law for the expenses of the Commission.

Chemist Ledoux submitted a verbal report upon the materials submitted to him for the proposed new work, favoring that of the Averell Company. He said that company

had also succeeded in treating paper tubes more successfully and satisfactorily than any other. He was now testing those tubes, and asked until Tuesday next to make a final report on them.

Mr. Lauterbach, for the construction company, asked for authority to proceed with the construction of the proposed subway in Fifty-eighth street from Sixth avenue to the East River, suggesting, however, that the route be changed to Fifty-seventh or Fifty-ninth street, subject to the approval of the engineers. He also said that their engineer, Thompson, preferred the new Averell tube to all others, and that the Metropolitan Telephone Company was willing to substitute the Averell conduit for that proposed last week.

Commissioner Hess said he had examined and caused to be tested some of the Averell conduit laid in Washington several years ago, and that it was perfectly satisfactory.

It was ordered that if the chemist approved the material and tubes, the engineeer prepare plans and specifications for the conduit proposed to be laid in Fifty-seventh or Fifty-ninth street, according to his judgment, and to report next Thursday.

President Flowers said the electrical companies were anxious for a subway leading from their main offices to the Brooklyn Bridge. He said that the route would be from Broadway and Cortlandt street to Mail street, thence to Park Row and the bridge. He thought this subway should contain thirty ducts, and that by its immediate construction one of the busiest parts of the city could be relieved of a cloud of over-head wires and a multitude of cumbersome poles.

Mr. Lauterbach approved the suggestion, and expressed the readiness of the Construction Company to undertake the work at once. An order was adopted directing the engineers to report plans and specifications for this work also next Thursday.

Lighting the Statue.

Mr. Goff, president of the company that furnished the electric light plant for the Bartholdi statue—donating it even after he had secured the competitive contract—publishes the following in the New York *Tribune* of Monday:

To the Editor of the Tribune:

SIR: Since my arrival here yesterday, I have read with much interest the reports in yesterday's and to-day's New York papers concerning the lighting of Bartholdi's Statue of Liberty, and the reported necessity of discontinuing the light for lack of funds. I have several times said that I would provide means for operating the electric lighting apparatus until Congress meets and appropriates funds for the purpose, provided the steam power was supplied and I could have charge of the apparatus in order fully to demonstrate its complete adaptability to perform the work for which it was designed.

Surely there ought to be patriotism enough in this great Republic of ours under the existing circumstances to aid in this patriotic work and thus save our people from the unfavorable impressions which a failure to continue the illuminating of France's noble gift would create in the minds of all Frenchmen.

I respectfully suggest that the public press of New York open a popular subscription to morrow for this purpose. I shall return to New York on Tuesday morning and will be pleased to co-operate in any way I can.

EDWARDS H GOFF.

BOSTON, Nov. 7, 1886.

—— A safe, portable and convenient electric railway reading lamp was shown at a recent meeting of the British Association. A cubical box of about four inches, and containing four cells, weighs six pounds, and will burn twelve hours; another form of battery, one-third this width and half the weight, is not more cumbrous than a book. The little lamp is fastened by a book to the waistcoat. The one exhibited had startled many a fellow passenger of the exhibitor, and had done good service for a fortnight.

Electrical Points of Interest.

Wheatstone's bridge was not invented by Wheatstone but by a Mr. Christie in 1833. As attention was called to the possibilities of the instrument by Wheatstone the origin of the name can be readily understood.

The mechanical work performed in the circulation of a man's body in a day is equal to $\frac{1}{3}$ of a horse-power for one hour. The amount of work performed by the heart in a day equals $\frac{1}{4}$ horse-power for one hour. This, if it could be made to operate a dynamo, would light two 16 candle-power lamps for one hour.

DIRECTIONS FOR THE CARE OF GRAVITY BATTERIES.—As soon as a cell is set up the poles should be connected by a wire for twenty-four hours. Keep the jar full of liquid one-quarter of an inch above the zinc As the liquid evaporates add water. Supply enough blue vitriol so that there may be some in the bottom of the jar. To prevent a too rapid evaporation of the liquid, some oil may be poured on top of the liquid. For this purpose kerosene will answer. Dirty zincs must be removed and cleaned. Every point of contact must be clean, and all screws tightened up if the battery is to give a good current.

At Gardiner, Me., one-hundred and fifty 16 candle-power incandescent lights are Sun distributors. The current is obtained from a No. 7 Brush dynamo.

In 1745, Cuneus, a philosopher of Leyden, discovered the Leyden jar named in honor of the town, and not of the inventor.

A $\frac{1}{4}$ inch spark from an induction coil is the maximum that can be taken with safety.

In one of the French schools there is a natural magnet which is capable of lifting forty times its own weight.

An ordinary telegraph wire could convey the whole electric current that might be generated by the power of Niagara Falls to any distance. But so high an electro-motive force would have to be used that sparks would fly from it into the air.

When the needles of an astatic needle are precisely equal in strength, they will set themselves so as to point East and West.

It is said that an old gentleman coiled up the end of his lightning rod, and put it in a bucket in his cellar, thinking that the water would extinguish the lightning.

A steel magnet when heated red hot loses its magnetism and does not recover it when cooled.

The velocities in air of light and of electro-magnetic induction are sensibly equal.

The resistance of a cubic foot (about a cubic yard) of glass at 392° Fahrenheit is 227,000 ohms.; at 750° it is 735 ohms.

AMALGAM FOR ELECTRICAL MACHINES.—Melt together five parts of zinc and three parts of tin, and pour gradually on the melted mixture nine parts of metallic mercury which has been previously warmed. The whole is shaken briskly till cold, in an iron or thick wooden box. It is then reduced to a fine powder in a mortar, sifted through muslin, and mixed with lard in sufficient quantity to reduce it to the condition of paste. This preparation should be spread evenly over the surface of the cushion, up to the line formed by the junction of the silk flap with the cushion.

With engines giving one horse-power per 4 lbs. of coal per hour, it would require as much coal for the boilers as could be lifted from 93 miles below the surface. That is, it would require the consumption of one ton of coal (disregarding loss by friction) to furnish power enough to raise one ton of coal 93 miles.

Batteries of all kinds should be kept at as nearly uniform temperature as possible. The separate cells should be insulated from each other. The whole shelf supporting the cells may be insulated from them if placed on the bottoms of inverted tumblers placed on sticks so that the glass edges do not come in contact with anything.

A battery is in short circuit or short circuited, when a short piece of some metal connects the two poles. To short circuit a battery is to connect the two wires leading from the battery by means of a short wire.

F. M. G.

—— An electric plant will soon be introduced into A. V. Morris & Sons' knitting mill, Amsterdam. The mill was closed on the 30th for repairs.

—— Rawitser & Bro. are leading off with a Brush-Swan electric lighting apparatus, with a capacity for 160 incandescent lights, at their River Mills, Stafford Springs, Conn. The beautiful white light of the Brush-Swan incandescent lamp makes it a great favorite everywhere.

—— The Stilwell & Bierce Manufacturing Company, Dayton, O., are enlarging their foundry to double its present size. They report business booming and the outlook good. Their turbine water-wheel is in use by many electric light companies, and giving fine satisfaction.

—— In an electric light item last week concerning the Milan station, an incandescent dynamo was given as having a capacity of 12,000 lights—the printers generously adding a cipher to the number. Twelve hundred incandescent lamps is a good-sized number for any dynamo, and that was what was intended.

—— The Edison Electric Light Company of New York has closed a contract with Alfred Dodge & Co., proprietors of the felt works at Dodgeville, Herkimer county, N. Y., to put in 500 incandescent lights. This building is four stories high and 700 feet in length. The plant is to be installed and in running order by November 20th. The dynamo will weigh 10,500 pounds.

—— Corporation Counsel Lacombe, of New York city, has advised the Commissioner of Public Works with reference to the application of the Business Men's Telegraph and Messenger Company and the Harlem Electric Illuminating Company for permission to string telegraph or electric wires in the northern part of the city, that no permit is required to string wires on private property; that the approval or consent of the local authorities is not needed where nothing is to be disturbed in the streets, and the street surface is not disturbed; that there is no discretion to be exercised by the Commissioner of Public Works either in granting or withholding consent; that the approval of the Commissioners of Electrical Subways must be obtained before these companies can suspend any wires above the streets, but no prior or subsequent consent of the Commissioner of Public Works is necessary.

—— One evening last week sparks were seen flashing from the electric light wires strung along the Second street side of Borden block in Fall River, Mass. The insulated covering had been worn off by the scenery hoisted up to the stage of the Academy of Music, and the bare wires swinging against the wet walls of the building caused the flashes and attracted a big crowd. The wires were fixed before any damage resulted. Later in the evening sparks were seen issuing from the arc wires which enter through the rear windows of the office of F. O. Dodge, treasurer of the Fall River Electric Light Company. When discovered, the sparks had set fire to the wooden window casing, which was then smoking. Several persons attempted to put out the fire, but received electric shocks. Finally the superintendent of the lighting company, who had been summoned by telephone, arrived and cut the wires, stopping the display. The window casing had only been scorched, and no damage resulted.

ELECTRIC LIGHT NEWS

—— The United States building in Wilmington is to be lighted by electricity.

—— The Pennsylvania Tack Works, Norristown, are having their establishment lighted by the incandescent electric light.

—— Bay City, Mich., is to be lighted by electricity, the Council having decided to purchase a plant to be owned and controlled by the city.

—— The Greenport (Long Island) Electric Light Company has been organized with a capital of $3,500, and Geo. F. Tuthill as president.

—— The Boise City Electric Light Company, Boise City, Idaho, has been incorporated. Capital stock, $25,000. President, W. P. Chandler.

—— The Hamilton Electric Light and Power Company, Hamilton, Ohio, has been incorporated. Capital stock, $50,000. James E. Neal, H. L. Macy, and others, incorporators.

—— The Dayton Edison Light and Conduit Company, Dayton, Ohio, has been incorporated. Capital stock, $100,000. H. H. Hoffman, A. Stuart, and others, incorporators.

—— Westinghouse, Church, Kerr & Co. have closed with the Carbondale Light, Heat and Power Company for a station of 1,000 6-candle-power lamps Work is being vigorously pushed.

—— The City Council of Los Angeles, Cal., through its clerk, Mr. W. W. Robinson, advertises for bids for lighting the city by electricity for two years. Communications should reach the clerk before Nov. 29.

—— The new electric light syndicate, at Beverly, Mass., has purchased the plant recently established there, but which was given up when the town would not adopt the light. The syndicate will have the works in running order by November 1.

—— The Waltham Gas and Electric Light Company, Waltham, has ordered 150-horse-power Zell water tube safety boilers of Huston, Perrin & Co., New England agents, 57 Oliver street, Boston. The Pemberton Mills, Lawrence, are also setting a Zell sectional boiler.

—— The Danville Nail Company, Danville, Pa., are installing a 300-light Westinghouse plant, and the Pencoyd Iron Works, of Philadelphia, one of 400 lights. Also the Pennsylvania Steel Company a similar plant of 400 lights. A number of 150 candle-power lamps are used in these installations.

—— The question whether the trustees of the town of Le Roy, N. Y., had a right to enter into a contract with an electric light company to illuminate the streets of that village for a year, will probably be decided in court. It is said the Le Roy Gas Company will begin proceedings to annul the contract.

—— The newly-chosen Board of Directors of the Walton (Mass.) Gas and Electric Lighting Company met on the evening of September 29th. An organization was perfected, and Mr. Lowell Clark was elected president and Mr. C. B. Stearns, treasurer and clerk. The five new directors were present and qualified. A general committee of six was appointed, as follows: C. C. Bills, chairman; M H Young secretary; A. M. Goodale, J. R. Farnum, William Roberts and C. E. Getchell. From this were formed sub-committees, as follows: A building committee, consisting of Messrs. Goodale, Getchell and Farnum; a committee to solicit orders for the electric light, composed of Messrs. Stearns and Goodale; committee on new steam apparatus, Messrs. Roberts, Getchell and Goodale.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOV. 2, 1886.

351,746 Electric alarm clock; Fred. E. Derrick and Solomon C. Brott, Lansingburg, N. Y.

351,759 Train signal system; Erwin S. Graver, Philadelphia, Pa.

351,834 Telegraph key; Marion R. Jenkins, Browning, Mo.

351,855 Electric lamp; Thomas A. Edison, Menlo Park, N. J., assignor to the Edison Electric Light Company, New York, N. Y.

351,856 Incandescent electric lamp; Thomas A. Edison, Llewellyn Park, N. J.

351,869 Incandescent lamp; Wm. P. Kookogey, Brooklyn, N. Y.

351,902 Magneto-electric and electro-magnetic machine; Rudolf Eickemeyer, Yonkers, N. Y.

351,903 Magneto-electric and electro-magnetic machine; Rudolf Eickemeyer, Yonkers, N. Y.

351,904 Electro-magnetic and magneto-electric machine; Rudolf Eickemeyer, Yonkers, N. Y.

351,905 Telephone; Rudolf Eickemeyer, Yonkers, N. Y.

351,906 Dynamo-electric machine or electric motor; Rudolf Eickemeyer, Yonkers, N. Y.

351,907 Device for taking electric currents from or to moving surfaces; Rudolf Eickemeyer, Yonkers, N. Y.

351,913 Protecting underground wires and pipes; Worcester Haddock, Cincinnati, Ohio, assignor of one-half to Jacob Frank, same place.

351,933 Quadruplex telegraphy; John M. Moffatt, New York, and Edward Blakeney, Brooklyn, N. Y.

351,961 Automatic electric current regulator; Chas. F. Brush, Cleveland, Ohio.

351,973 Electric lamp; Alenza T. Gifford, Hopedale, Mass.

352,006 Incandescent electric lamp; Frederick Schaefer, Boston, Mass.

352,007 Incandescent electric lamp; Frederick Schaefer, Boston, Mass.

352,043 Circuit closer; Harry B. Cox, Cincinnati, Ohio.

352,044 Electro-mechanical whistle; Harry B. Cox, Cincinnati, Ohio.

352,057 Temperature regulator; Warren S. Johnson, Milwaukee, Wis., assignor to the Johnson Electric Service Company, same place.

352,059 Steno-telegraph instrument; William A. Kaler, Larwill, Ind.

352,070 Magnetic tack hammer; Arthur R. Robertson, Somerville, Mass.

352,074 Commutator brush; Charles J. Van Depoele, Chicago, Ill.

352,084 Medical induction coil; Luis Drescher, New York, N. Y.

352,086 Electrical ticket exhibiting machine; Henry J. Eunis, Washington, D. C., assignor to John E. Talty, same place.

352,105 Induction coil; Karl Zipernowsky, Buda-Pesth; Maximilian Deri, Vienna; and Otto Titus Blathy, Buda-Pesth, Austria-Hungary.

Business wanted for a two-story factory, 75×35, well lighted, engine, gas, etc.; built to encourage some industry in the village of Mattapoisett, Plymouth Co., Mass. Apply to P. M.

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NEW YORK & WASHINGTON ELECTRICAL PATENTS.
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A. C. FOWLER, C. E., Attorney at Law, EXAMINER IN U. S. PATENT OFFICE, 1880 to 1886, ELECTRICAL DIVISION. Office, Temple Court (Beekman and Nassau Streets, New York City.
CHAS. D. FOWLER, Counselor at Law. Office, Pacific Building (622-4 F Street, half block east Patent Office), Washington, D. C.
Investigations and Correspondence in FRENCH and GERMAN.

EDWARD P. THOMPSON, Solicitor of Electrical Patents, and Electrical Expert (two years Manager—successor to N. S. Keith—of the Pat. Agency of the *Electrical World* and Associate Editor), who *personally* prepared and prosecuted, while Manager, every case in caveats, patents, trade marks, etc., submitted to the Agency, has established, as sole proprietor, manager and attorney, a patent office. No risks. Deposits to be held by the Madison Square Bank, New York, till the client is satisfied with the work; otherwise refunded. From the Agency's circular, distributed just befor my departure: "We could fill pages of sim ar unsolicited compliments. We might add that since these letters were received we have done additional patent business for nearly all the above, and that to our knowledge we have never lost a client." Write for personal testimonials and instructions, to E. P. THOMPSON, Temple Court, Beekman st., N.Y.

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Fig.259

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Fig.255

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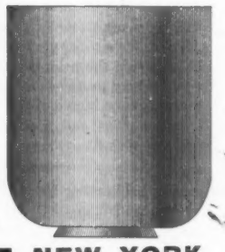

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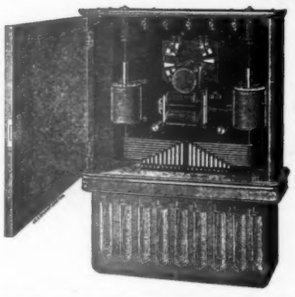

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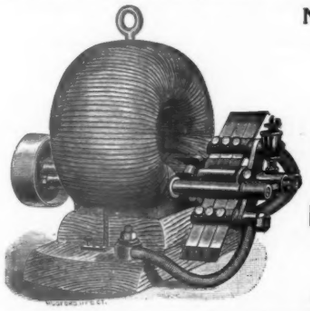

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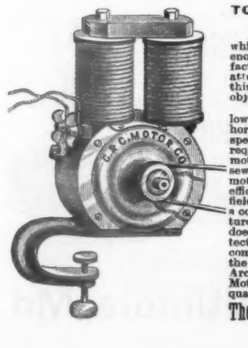

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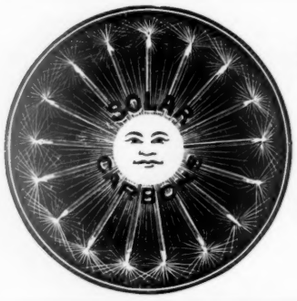

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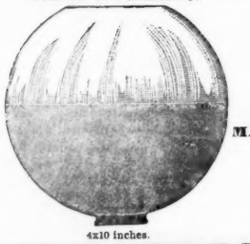

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MANUFACTURERS OF EVERY DESCRIPTION OF
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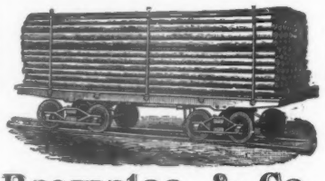

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Made of Best Materials and in the Best Style of Workmanship.
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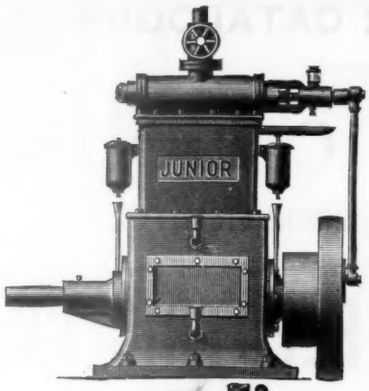

Enjoying the Largest Market of any Engine manufactured in the United States, we shall further enlarge it by a Rebate to the Purchaser of a share of our earnings in the shape of a

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The First Reduction is now in effect, and others will follow as results warrant. All our Latest Improvements are in force.

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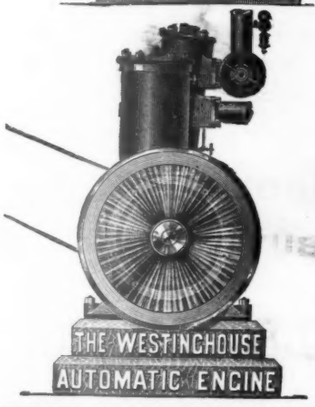

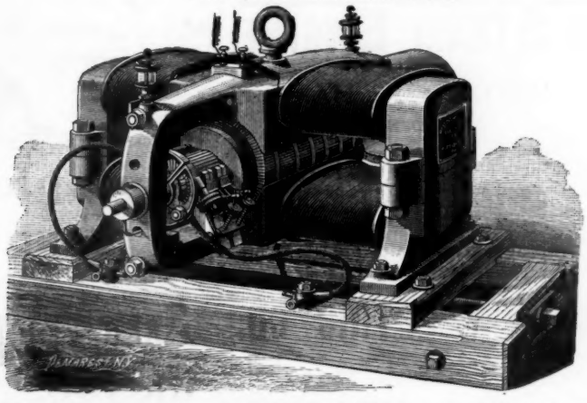

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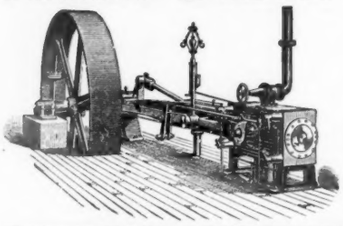

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Gas Consumed in Cubic Feet.	132	126	120	114	102	42.6	34.8

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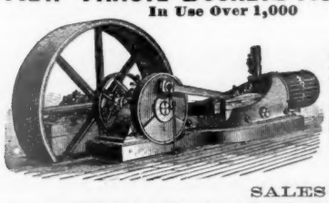

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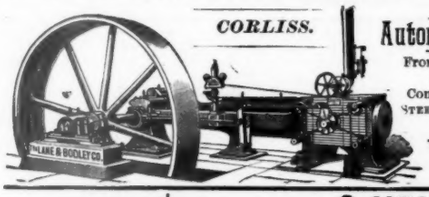

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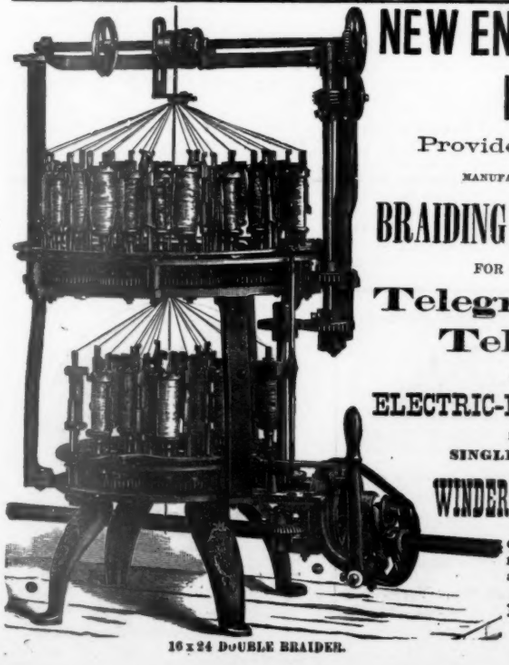

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SYSTEM OF

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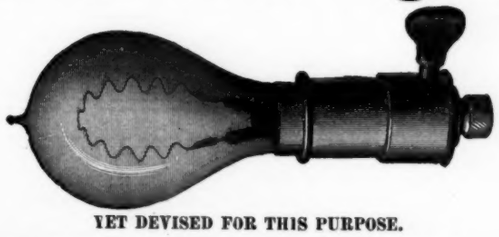

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